







FROM THE LIBRARY  
OF  
W. T. JACKMAN  
PROFESSOR OF  
TRANSPORTATION  
IN THE  
UNIVERSITY OF  
TORONTO





Digitized by the Internet Archive  
in 2008 with funding from  
Microsoft Corporation



































60957  
31 5 55

# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. C. Building  
231 241 West 39th Street, New York

## CONTENTS

Vol. XXIV, No. 1

Feb. 1, 1921

### LEADING ARTICLES

Increasing Business by Carrying Insurance.....	1
The Battle Against Snow—10—Weapons of the Future .....	12

### MISCELLANEOUS ARTICLES

New Equipment and Truck Trends at Recent Transportation Show.....	6
Two Trucks Earn \$9,500 a Year.....	10

### DEPARTMENTS

Rear Axle Repair and Adjustment—6—Ford Worm- Driven Axle .....	4
The Better Way.....	16
Accessibility a Feature of New 1½-Ton Denby.....	20
New Luedinghaus a 1-Tonner.....	20
Thomart Enters Truck Field with Akron Multi 1-Tonner .....	21
New 1-Ton Stoughton Designed for Speedy De- livery .....	21
Shop Equipment.....	22
New Accessories and Parts.....	24
The Editor's Viewpoint.....	26
The Fleet Owners' Forum.....	27
Motor Truck Electric System Wiring Diagram.....	30

### NEWS

New England Freight Rates Too High.....	31
Delivery Convention March 14 to 17.....	31
Truck Transportation in Fruit Belts.....	32
Utah Association to Protect Owners.....	32

INDEX TO ADVERTISERS.....90-91

## The Commercial Vehicle

Charles W. Blackman, General Manager

EDITORIAL DEPARTMENT

David Beecroft, Directing Editor

Ray W. Sherman, Executive Editor

Joseph Husson, Editor

F. E. Spooner and Sinclair Gluck

Associate Editors

Published on the first and fifteenth of the month. Entered as second class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

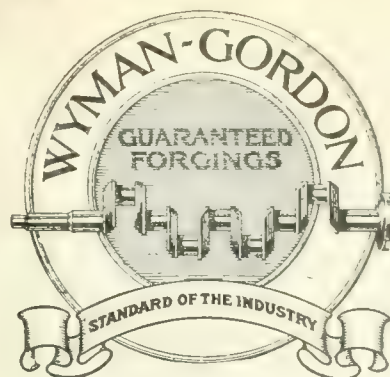
Chicago, Mellers Building, 59 East Madison Street  
Detroit, 317 Fort Street West Cleveland 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 512 Tremont Bldg.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law .....	.50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



# FAITH

WYMAN-GORDON'S entrance into the automotive field, some years ago, was to give substance to a steadfast faith in its future.

We believed that the automotive industry was a necessity to the vital forces of a fast-moving world. And this prophetic vision of a new and greater transportation is realized today in an industry of tremendous proportions.

This same resolute faith animates us now, when a passing cloud casts a temporary shadow over the world's business hopes.

## Wyman-Gordon Co.

*"The Crank Shaft Makers"*

Worcester, Mass.      Cleveland, Ohio  
Chicago, Ill.



# CONTINENTAL

*"The Efficiency Standard"*

# SHOP EQUIPMENT

## The Efficiency Standard— What It Means to You

Continental Shop Equipment has long been known as the best that money can buy. The thousands of Continental users throughout the country are unanimous in their praise of this efficient equipment.

To you Continental Shop Equipment means a great deal. It means valuable savings in time—for jobs go through Continental equipped shops in about half the usual time necessary. That means faster service to your customers and more profits to you. It encourages more efficient work which means better service to your customers, and satisfied customers build you a bigger business. It means better satisfied employees because of the freedom and ease with which work can be accomplished.

With a Continental equipped shop you can command the sales agency of most any car, for the manufacturers who universally endorse Continental equipment are anxious to have as their sales representative the service station that can give quick, efficient service.

And remember that the local representative of the car you sell depends upon your ability to give real service to its owners. You cannot afford to have anything but the best of shop equipment.

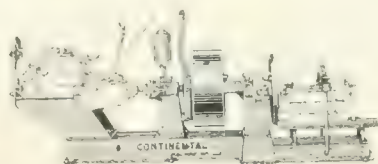
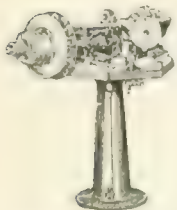
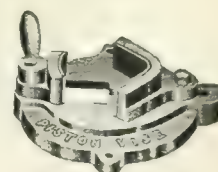
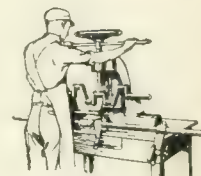
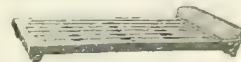
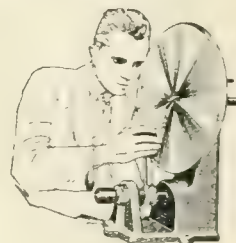
And that is Continental.

Get in line today—equip your shop for bigger business and you'll get it. Write for catalog of our complete line.

### Continental Auto Parts Co.

2102 East Seventeenth Street

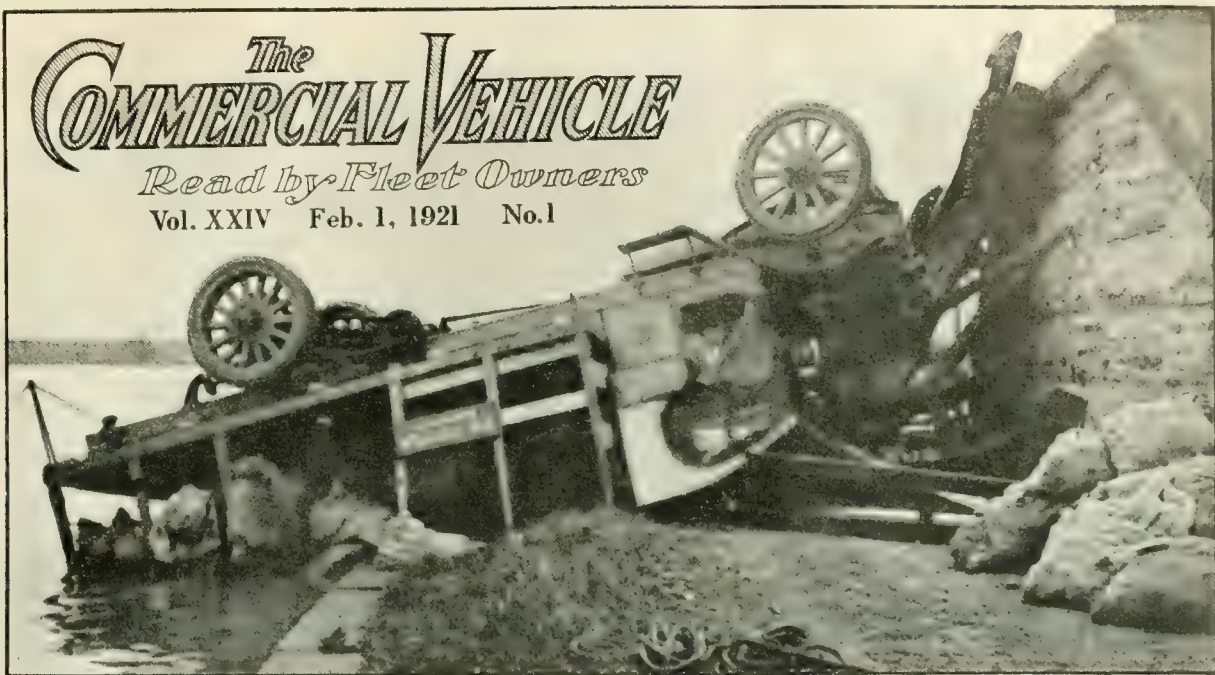
Columbus, Indiana



# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXIV Feb. 1, 1921 No.1



## INCREASING BUSINESS

*By Carrying Insurance on Goods  
Moved in Motor Trucks*

**3 FORMS of such insurance  
now available as follows:**

- 1—Covering the owner's goods on his own trucks.*
- 2—Covering the legal liability of the truckman for goods in his custody.*
- 3—Covering the interest of the shipper in goods in the custody of the truckman.*



# Increasing the Truckman's Business

## 3 FORMS OF POLICIES: 1—Blanket 2—Open 3—Trip

By Joseph Husson

**I**F insurance on the goods carried will increase the business of the public truckman or reduce the losses on goods carried on the owner's trucks, then that insurance is a good thing.

It is now possible to insure at equitable rates, goods carried on motor trucks, whether these trucks are owned by private concerns to deliver their own goods or are owned by public truckmen delivering other people's goods.

While such insurance has been written in a desultory manner for some few years back, the great increase in the use of trucks by private owners and public truckmen has led several insurance companies to make provision for handling such goods insurance on a big scale to the end that the rates may be reduced to as low a figure as possible.

The greater use of trucks in both public and private haulage has set up an entirely new set of conditions as compared with horse haulage. Both the size and the value of the load has increased and much goods formerly shipped by railroad is now sent overland by motor trucks. The length of the haul has also greatly increased, due to the superior ground-covering ability of the motor truck as compared with the horse wagon. Likewise the speed of the delivery has been increased.

### Necessity for Insurance

All of these factors when considered as one set of conditions have tended to increase the hazards of delivery. Because of the mechanical means of transport the fire hazard has been raised and because of the longer hauls, the ability of bridges to withstand heavy trucks with their loads has had to be considered. Also, due to the increased speed of deliveries, the collision hazard has become of considerable importance.

All of these conditions have led up to the necessity for providing some means of protection for the goods in transit. This protection may be afforded to the shipper of the goods or to the carrier of the goods.

Until adequate insurance coverage was made available, the carrier in some instances had to frankly acknowledge his inability to assume any responsibility. This threw the risk entirely upon the shipper and tended to discourage the shipment of valuable commodities by truck except in extremely urgent cases.

In other cases, where the carrier assumed the liability without insurance coverage, he frequently found himself financially crippled or even ruined where, due to no fault of his own, goods had been lost through accident or theft.

The purpose of this article is not to sell insurance on goods carried in motor trucks but simply to tell the fleet owner what forms of insurance are available, from what companies such insurance is procurable and how much, in a general way, such coverage costs. It should be borne in mind that insurance on goods

flood, meaning the rising of navigable waters; cyclone and tornado; perils of the seas, lakes, rivers or inland waters while on ferries only; collision, i. e., accidental collision of the truck or trucks during the period insured with any other automobile, vehicle or object; overturning of the motor truck, and collapse of bridges.

In this form of insurance, the valuation of the load to be insured is set by the insurer and each truck is considered as a unit and the load carried on that truck as a unit. For example, if insurance is taken on the maximum load valuation of \$5,000 on one truck, the insurance does not cover a load of the same valuation when carried on another truck. By the blanket insurance policy, the risk is covered on any number of loads carried by the truck specified over the period of the insurance. The insured, however, is privileged to substitute another truck or trucks provided they are owned and operated by the insured and reports of all such substitutions are made as soon as practicable and additional premiums paid if required.

### The Blanket Policy

The blanket insurance policy covers the merchandise insured only while in the custody of the assured and actually in transit within the limits of the United States and Canada. The goods are covered when on a truck in a public garage, but not covered when the truck is in the garage of the assured.

The rates for such blanket insurance vary from 3 to 4 per cent of the valuation of the load. The rates vary according to the age and type of truck; the character of merchandise; the length of haul; the territory traversed and the conditions at the principal location of the operation.

The open policy is a comparatively new form of insurance. In frequent cases it does not provide that all shipments be covered. Insurance or not is then at the option of the assured with provision made for a prompt reporting of risks to be covered. This form of insurance when issued to public truckmen enables them to solicit business from customers and to assure them of protection and at the same time cover themselves regarding legal liability. With the open type of policy the risk must be reported to the insurance company within 6 hours after it has become known to the assured and the reports must be

### About Rates on Aetna Policies

1—BLANKET policy rates vary from 3 to 4 per cent of amount of insurance carried.

2—OPEN policy rates vary from 10 cents to 35 cents per \$100 valuation on goods carried by public truckmen and from 2 to 4 per cent on goods carried in owner's trucks.

3—TRIP policy rates are made separately for each individual trip according to certain conditions told in the accompanying story.

carried in motor trucks is entirely separate from the more common forms of insurance on the truck itself, such as fire, theft, collision, property damage, liability, etc.

The Aetna Casualty & Surety Co., through its Inland Marine Department, is offering three types of insurance on goods carried in motor trucks and known under the heads of 1—Blanket; 2—Open, and 3—Trip. Although the rates vary for these three different kinds of insurance, they also vary according to whether the goods are transported on trucks owned by the shipper or trucks owned by an outside public truckman.

As a general thing, the blanket insurance policy covers against loss or damage to goods directly caused by fire, including self-ignition and internal explosion of the conveyance and lightning;



# with Insurance on Goods Carried



*Cargo insurance protects both the truckman and the owner of the goods against loss due to such accidents as shown above, where a bridge rated to carry heavy trucks has given away and allowed the truck to fall into the stream below*

made on blanks furnished by the insurance company for such purpose. Premiums on such policies are generally due and payable on the tenth day of each month following the date of shipment.

The rates for such open policies are charged according to two usual classes, including general merchandise and household furniture, with higher rates for the latter. This may be partially explained by the physical characteristics of the interests and the difficulty in case of partial loss in determining the valuation of household furniture and appreciating that general merchandise is more frequently invoiced.

The rates also vary according to whether the goods are carried on the trucks of the assured or on the trucks of a public truckman. When carried on trucks of a public truckman, the rates vary from 10 to 35 cents for each \$100 valuation. For goods carried on the concern's own trucks, the rate is from 2 to 4 per cent of the valuation.

The trip policy or certificate is written to cover a definite shipment of merchandise from one location to another. The coverage of the risk ceases after the truck has arrived at its designated point and discharged its load. Because the rate varies according to the length of haul, the kind of truck employed and the classification of the goods moved, it is impossible to give any set rate to cover all cases. Each trip and load must be considered separately. As an indication, however, of the cost of trip insurance, one might cite the haulage of news print paper between New York and Philadel-

phia, a distance of 104 miles, on which the rate would be 12½ cents per \$100. For household goods the rate would be 25 cents per \$100. On a 250-mile trip between New York and Boston, the rate on a load of machinery would be 25 cents per \$100 and on household furniture, 50 cents.

The Underwriters Inspection & Adjustment Co., with main offices in Cleveland, will also arrange for motor truck cargo insurance under two forms of policies

## Special Service

*rendered by the Underwriters Inspection & Adjustment Co.*

- 1—Closer co-operation between shipper and truckman.
- 2—Handling of claims for loss or damage to freight shipped by truck.
- 3—Installation of truck cost systems by truckmen and inspection of trucks.
- 4—Certification of responsible truckmen.
- 5—Saving of time for the shipper.

written by another of the large insurance companies. Both forms include a pilferage or theft coverage which has never

been included heretofore in Inland Marine cargo insurance.

The first form of insurance is known as the Shippers Automobile Transit Policy and the second, the Carriers' Legal Liability Automobile Transit Policy. The former policy protects the goods of the shipper while the second policy protects the truckman by indemnifying him for his legal liability for loss resulting from fire, theft in excess of \$100, transportation and collision in excess of \$100 with the exception of liability for loss or damage to certain stated classes of commodities.

## Certified Truckmen

One important and entirely new phase of the cargo insurance made available by the Underwriters Inspection & Adjustment Co. is the compilation by that company of a list of certified public truckmen. In order to be listed, the Underwriters company must first make an inspection at the main office of the truckman and check over his books; verify financial statements; investigate banking facilities, credit and local standing; investigate the truckman's accounting and cost system and then make a report to the home office. If such an investigation proves satisfactory, the truckman will be placed on the certified list and this will permit him to secure insurance coverage on goods which he carries.

The rates quoted for such coverage are 10 cents per \$100 based on the value of shipment, for the first 200 miles and 1 cent per \$100 for each additional 50 miles of haulage. It is probable, how-

*(Continued on page 5)*



# Rear Axle Repair and Adjustment

*A Series of Articles to Assist Maintenance Superintendents in Carrying on Axle Repairs*

## 6—Ford Worm-Driven Axle

THE repair of the worm-driven axle used on the Model TT 1-ton Ford truck presents problems which are different from those encountered in the bevel-driven axle used on the Model T car so often employed for light delivery service.

The axle is of the live axle type, just as is the bevel gear-driven axle of the Model T car. The worm is placed above the worm wheel and the differential assembly and the worm shaft is supported by roller bearings which take all radial load while the end thrust is taken by a special ball bearing mounted at the back end of the worm shaft. The differential gear assembly is supported by cup and cone type of ball bearings. The wheel end of the axle drive-shaft revolves on a flexible roller bearing just as in the delivery car.

To remove the worm-driven axle, proceed as follows:

1—Disconnect the universal joint from the driveshaft by removing the two plugs from the top and bottom of the ball casting. Turn the shaft until the pin comes opposite the hole. Drive out the pin and the joint can be pulled or forced away from the shaft and out of the housing.

2—Jack up the truck, place supports

### Axles Described in Previous Issues

*Maintenance superintendents who wish to refer to articles on axles that have already been described will find them in the following issues:*

1920

1—Timken.....Nov. 1

2—Clark.....Nov. 15

3—Packard.....Dec. 1

4—Wisconsin...Dec. 15

1921

5—Ford (Bevel)

Jan. 15

6—Ford (Worm)

This Issue

under the rear axle housings, and remove the rear wheels.

3—Take out the four bolts connecting

the universal ball cap to the gearset case and cover.

4—Disconnect the brake rods.

5—Remove the nuts holding the spring perches to the rear axle housing flanges.

6—Raise the frame by placing a long bar or gas pipe under the frame just in front of the rear spring, one end resting on a substantial support of the proper height.

7—Two workmen at the other end of the bar can raise the frame and place the end of the bar on another support.

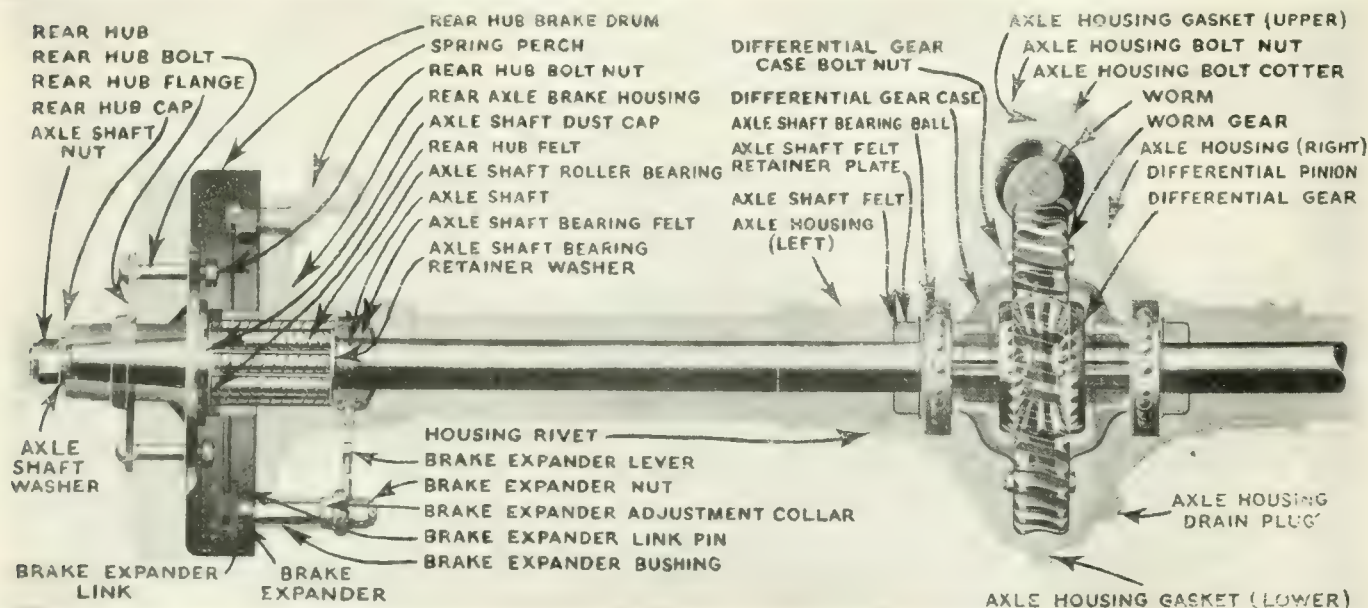
8—The rear axle assembly can then be withdrawn.

Next disconnect the axle, as follows:

1—Remove the rear axle housing cap; also the bolts which hold the two halves of the differential housing together.

2—Remove the cotter pins, bolts and nuts from the differential housing and pull apart.

The differential gear is fastened to the inner end of the rear axle shaft by means of splines and is held in position by a ring which is in two halves and fits a groove in the rear axle shaft. To remove the gear, force it down on the shaft, that is, away from the end to which it is fastened, drive out the two halves of the ring in the groove in the shaft with a



*Phantom view of the worm-driven axle used on the Model TT Ford 1-ton truck, showing the axle shafts and supporting bearings, the worm and other component parts*



screw driver or chisel and force the gear off the end of the shaft.

To remove the worm, proceed as follows:

1—Drive out the pins which hold the coupling to the worm and driveshaft.

2—Remove the felt washer, roller bearing sleeve and roller bearing by slipping them over the coupling.

3—Drive the coupling off from the driveshaft and then force the worm from coupling.

4—Remove the worm nut, thus permitting the removal of the retaining washer, thrust bearing and rear worm roller bearing.

In reassembling, be sure that the pin which holds the retaining washer stationary is in place. The worm is assembled with .006 in. to .015 in. end play. The bearings of the worm must not exceed 1.623 in. or be less than 1.615 in. The driveshaft to the worm coupling should be a drive fit. After the parts are assembled, the worm should be turned free by hand a few revolutions to determine whether or not the parts are true and without high spots.

Removal of the rear axle shaft is accomplished in the following way:

1—Take out the cap screws holding the driveshaft tube to the rear axle housing.

2—Remove the rear axle housing cap and the bolts which hold the two halves of the differential housing together.

3—Pull or force the housings from the shafts and disassemble the differential.

After replacing the axle shaft be sure that the rear wheels are firmly wedged on at the outer end of the shaft and the key is in proper position. When the truck has been driven 30 days or so, make it a point to remove the hub cap and set up the lock nut to overcome any play that may have developed. It is extremely important that the rear wheels are kept tight, otherwise the constant rocking back and forth against the keyway may in time cause serious trouble.

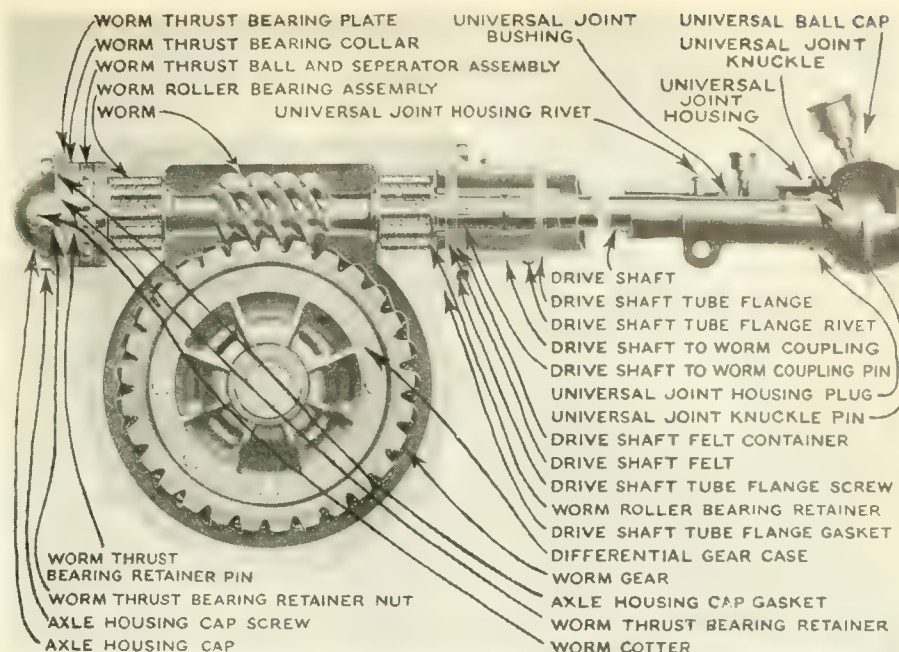
The back wheels should not be removed unless absolutely necessary, in which case proceed as follows:

1—Take off hub cap, remove cotter pin and unscrew castle nut and spindle washer.

2—The adjustable bearing cone can then be taken out and the wheel removed from its tapered shaft to which it is locked with a key.

In replacing the rear wheels be sure that the nut on the axle shaft is as tight as possible and the cotter pin is in place. The hub caps should be removed occasionally and the lock nuts which hold the hub in place tightened up. If these nuts are allowed to work loose, the resulting play on the hub key may eventually twist off the axle shaft.

The wheels should be jacketed up periodically and tested, not only for smoothness or running, but for side play as well. If in spinning a wheel, a sharp click occurs now and then and the wheel is momentarily checked, it is probably due to worn bearings. A wheel in perfect adjustment should, after spinning, come to rest with the tire valve directly below the hub. It is a good plan to clean



View of the worm-drive gearing used in the Model TT Ford 1-ton truck axle. The meshing of the worm and worm wheel is shown.

the bearings frequently and keep the hub well filled with grease.

## Testing Brakes

After the rear wheels have been removed, the brake shoes should be examined as they are exposed. It sometimes happens that a slipping brake is caused by oil deposits rather than wear. In this case the slipping is easily remedied by cleaning out the interior of the brake drum and the faces of the brake shoes thoroughly with gasoline. If the shoes show signs of wear, which can be ascertained by noting if some portions are worn thinner than others, new brake shoes should be obtained and installed in place of the worn members. All that holds the brake shoe assembly is one retention bolt carried by the plate at the end of the axle. When this bolt is removed the brake shoe assembly can be pulled away from the axle and the expander cam. It is much cheaper to replace worn shoes with new ones, which are inexpensive, than to attempt to get further service from the worn brake shoes by building upon the faces, which are in contact with the expander cam.

When new cast iron shoes are installed the wheel should be pushed on the axle taper and turned around with the hand brake lever in neutral position to make sure that there are no rough spots that will bear against the brake drums and cause friction, make a squeaking sound, and produce heating of the brakes when the truck is running forward on high speed. If any rough spots are found, they should be smoothed off with a file.

If the brake shoes have been replaced after the actuating rods have been shortened several times it should be born in mind that these rods must be lengthened again to normal length when the new brake shoes are fitted.

Extreme care must be used in lubricat-

ing the differential. A good grade of heavy fluid or semi-fluid oil, such as Mobiloil C or Whitemore's worn gear protective, should be used and carried at a level with the upper oil plug. The differential is supplied with the required amount of lubricant when the truck leaves the factory and the supply should be maintained by replenishments as required. After running the truck about 500 miles, the oil should be drained off by removing the lower oil plug, and the differential filled with fresh lubricant. This operation should be repeated at approximately every 1,000 miles, and after that whenever necessary. The rear axle outer roller bearings are lubricated by means of dope cups. These cups should be kept filled with a good grade of grease and given a full turn every 100 miles. Before putting the truck back in service after the rear axle has been taken down, fill the differential with oil, jack up the axle and run it for 5 or 10 min. to insure proper lubrication of all bearings.

## Goods Insurance

(Continued from page 3)

ever, that this rate may be materially reduced at a later date. In case the city haulage where it is impossible to secure valuation of the goods carried, the insurance is written on a flat premium basis per truck with no monthly declaration required from the carrier.

On long distance hauling outside of city limits, policies are written on a monthly basis arrangement under which the truckman provides a monthly statement of the value of the goods hauled and remits accordingly. Each certified truckman is provided with a combination receipt and insurance certificate, so that the shipper is assured that his goods are covered in transit.



# New Equipment and Truck Trends at Recent Transportation Show

- 1—Refrigerator body uses Balsa wood instead of cork as an insulating material.
- 2—Worcester rail carriage for passenger carrying trucks on defunct railroad lines.
- 3—The Interborough combination derrick and hoist with a magnetic lift.
- 4—New Hinkley overhead-valve engine featuring a new governor.
- 5—The W-S-M valve-in-head engine with removable cylinder liners.
- 6—The Moline hood when swung back is held upright by snap lock on dashboard.
- 7—New headlight mountings on Clydesdale and Ward La France trucks.
- 8—New starting crank on Transport. Combination brackets on Selden.
- 9—New steps and spring mounting on Clydesdale. Christensen air starter.
- 10—New Clark and L M axles. Copithorn truck type of demountable rim.

VISITORS at the Highway Transportation Show held in New York Jan. 3 to 8 found much of interest in the way of new bodies, parts and accessories, as well as new trends in motor truck design. Noteworthy among the new bodies was the Balsa, made by the American Balsa Co., New York City. The design of this body and the method of cooling it is the same as that incorporated in the design of the A-B-C refrigerator body, which has for its basis the automatic circulation of brine through a series of pipes directly under the roof of the body. This body was described in the May 1 and 15, 1920, issues of the COMMERCIAL VEHICLE.

Instead of the use of cork as in the A-B-C body, Balsa wood is used. Balsa wood has the same heat-resisting qualities as cork but has more tensile strength and is one-third lighter. This body is constructed without supports and thus weighs much less than the old-style bodies.

## Worcester Rail Carriage

Much interest was shown in the Worcester rail carriage for use on passenger carrying trucks on defunct railroad lines. This carriage was mounted on a  $\frac{3}{4}$ -ton Reo truck fitted with a bus body. The four-wheeled carriage at the front permits the highest speed on a curved track with safety and eases the riding of curves. The rear driving wheels are permanently mounted on the axle. Brakes may be applied to the front wheels when desired for steep grades where more braking power is wanted than can be supplied by those on the rear wheels. Two sets of band brakes act on the rear wheel drums. These are operated by pedals. The brakes on the front carriage are operated by the steering wheel. Standard equipment is for 56½ in. gage. J. Blaine Worcester, Middletown, N. Y., is the manufacturer. Narrow gages of

track down to as small as 42 in. can also be taken care of.

One of the unusual exhibits at the show was the display of a combination derrick and hoist mounted on a trailer. This outfit was made by the Interborough Hoist & Body Co., Newark, N. Y., and is designed for taking care of the lifting of heavy steel or other metal parts, a mag-



View of the Moline hood held up right by a snap lock

netic lift being included in the equipment on the derrick.

The parts exhibits included a number of truck units that were seen by the public for the first time. Among these were the new Hinkley overhead-valve engine, the W-S-M engine designed by Joseph Van Blerck, and the new Clark axle used on the Kelly-Springfield 3½-ton truck.

## New Hinkley Engine

The feature of the new engine made by the Hinkley Motors Corp., Detroit, is the governor, which is original with Mr. Hinkley. It is of the flyball type, and is mounted at the rear end of the engine, being geared up from the camshaft. The

governor has four flyballs, which revolve on a vertical axis. The centrifugal force on the flyballs is counteracted by a coiled torsion spring, acting through a lever on the sliding collar of the governor. The outer end of the torsion spring is secured to the hub of an adjusting lever, which is adapted to move over a sector with a number of adjustment holes in it. Thus the governor can be readily set to hold the engine down to any maximum speed within wide limits. The governor is very sensitive, and when set in any definite position, controls the speed of the engine within narrow limits between no load and full load.

The new Hinkley engine has a bore of 4½ in. and a stroke of 5½ in., giving a displacement of 352 cu. in., and weighs approximately 900 lb. The oil pan is of aluminum and has an oil capacity of 8 qt. A chrome nickel steel crankshaft is used. Provision is made for both magneto and battery ignition, and also for an electric starter and generator. The engine is provided with an S. A. E. No. 2 bell housing. Three-point support is used, there being a large trunnion bearing at the front end. Lubrication is by the force feed method, a gear pump being mounted in the oil pan below the oil level. Any standard make of carbureter can be fitted, in conjunction with a hot-spot manifold.

## W-S-M Engine

The W-S-M engine made by the Wellman-Seaver-Morgan Co., Akron, Ohio, has much of interest in the way of convenience during the repair period. Among the features connected with its design are the cylinder liners, which may be removed without taking the engine from the chassis. These liners are all of standard dimensions, thus eliminating the practice of carrying oversize cylinders and pistons. Other features include connecting rods and pistons, which can be replaced from either the top or bottom of the engine; a cylinder head which can be taken off when it is necessary to remove carbon and grind valves, and two hand hole



plates on each side of the engine for inspection. The removal of the oil pan may be effected without injury to the gaskets. Lubrication of every moving part in the engine is taken care of by a pressure system. The fan is driven by a gear, thus eliminating the use of a belt. The governor is of the flyball type, of W-S-M design. It is always running in a bath of oil. The breather pipe leading to the mouth of the carburetor is connected to the governor and thence through the governor throttle rod tube, keeping all working parts thoroughly oiled at all times. The speed may

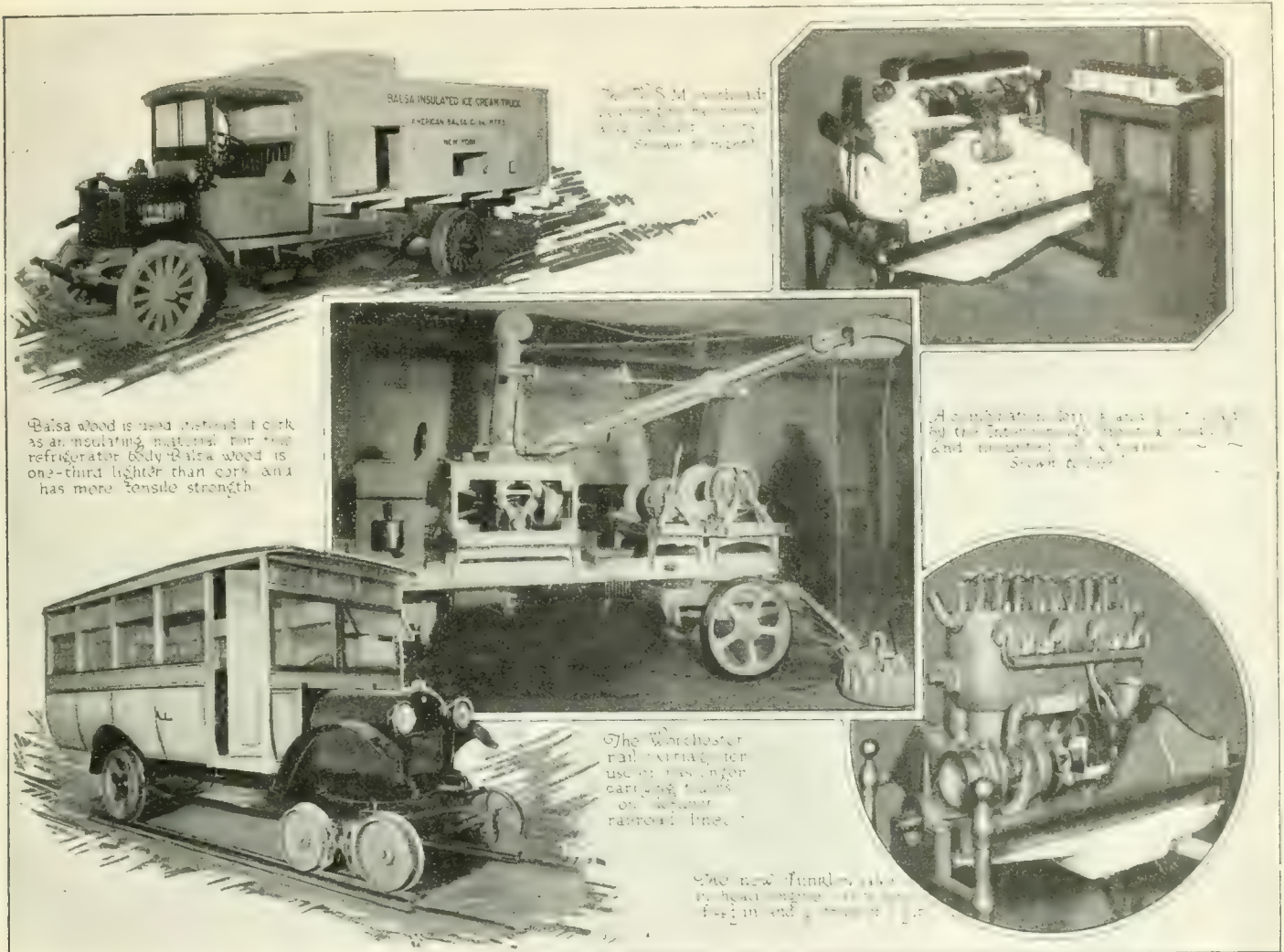
model now also has a four-speed gear-set, while the engine remains the same. The torque reaction is taken by the springs, while the drive is taken by the radius rods.

Among the new parts on exhibit in the New York hotels was the new L M double reduction truck axle for  $\frac{3}{4}$  and  $2\frac{1}{2}$ -ton trucks, the L M aluminum truck wheel with curved spiral spokes somewhat similar to those employed in cast steel freight car wheels, and the Nedoma-Najder rotary engine.

The L M axle and wheel is made by the L M Axle Co., Cleveland, Ohio. The axle

the Moline hood, which, when swung back, is held upright by a snap lock fastened on the front of the dashboard. This same truck has provision for protecting the radiator and engine against the cold blasts of winter. This is accomplished by the use of slides into which cardboard or tin may be placed. Another convenience for the driver is a primer that has been placed at the front of the truck so as to enable quick starting of the engine when being cranked by hand.

On one model of the Clydesdale was shown a pair of electric headlights of rather unique design. These were



Some of the interesting exhibits at the recent Highway Transportation Show in New York

be regulated by means of an adjusting screw.

The Kelly-Springfield truck, now sold by Hare's Motors, Inc., had on its  $3\frac{1}{2}$ -ton model a new type of internal gear-driven rear axle of Clark design. Heretofore the chain drive has been standard on this model. The new axle has a chrome nickel steel supporting member with a downward bend at the middle, which is forged with lugs to which the housing of the differential and bevel-drive gear is bolted. From this housing extend the jackshafts which do not have the usual tubular coverings, but instead carry drums for the service brakes on both sides of the housing. This truck

is the design of Leo Melanowski and is featured by placing the differential on the propeller shaft instead of on the axle shafts. The axle is featured by its high mechanical efficiency, light weight and road clearance, which, with the use of the L M aluminum wheels, gives a truck rear end of extremely light weight.

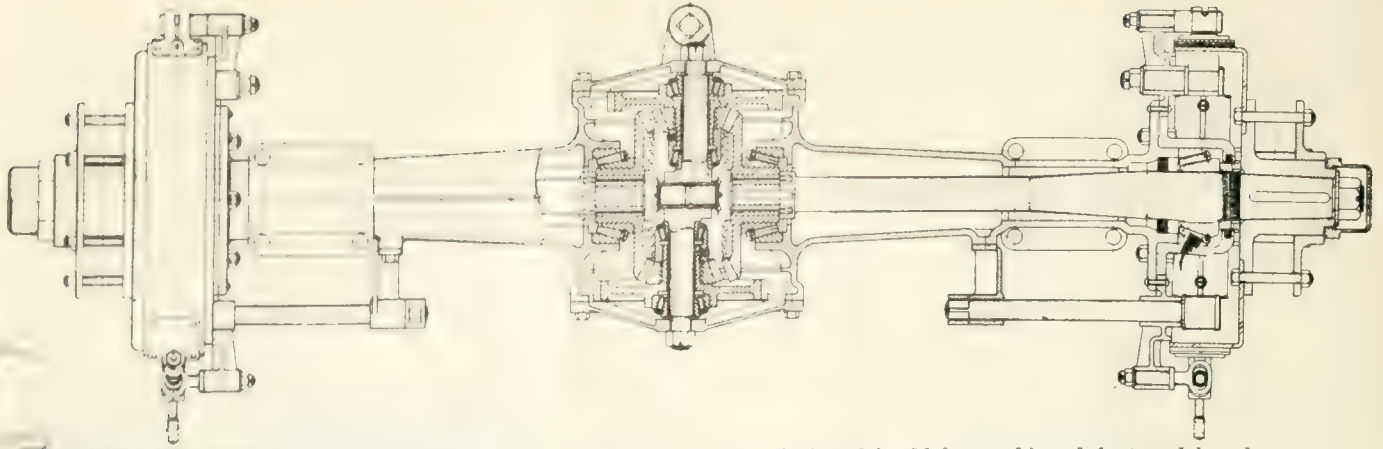
The Nedoma-Najder rotary engine is a five-cylinder, air-cooled design with a single sleeve. The engine weighs 160 lb. complete.

The tendency in truck design has been progressing towards refinements that permit of accessibility in getting at certain parts of the trucks for inspection and adjustment. An example of this is

pyramidal in form, with an octagonal front, and bolted to the sides of the radiator. On this same model there was a neat instrument panel secured to the dashboard. The instrument panel was slanted so as to give the driver a good vision of the instruments, and contained the ammeter, oil gage, magneto lock switch, lighting switches and choker.

Another method of headlight attachment to radiators was shown on the 5-ton Ward La France. The maker claims that because the radiator is mounted on springs there is less vibration and, therefore, an absence of bulb breakages that would normally occur were the lamps mounted elsewhere.





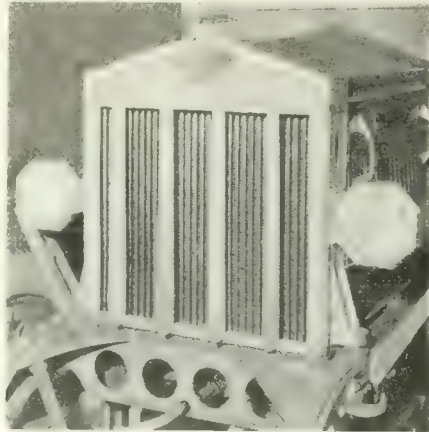
The L. M. double reduction truck axle for  $\frac{3}{4}$ - to  $2\frac{1}{2}$ -ton trucks, designed by Melanowski and featured by placing the differential on the driveshaft instead of on the axle shafts

On some makes of motor trucks the starting crank is supported by a bracket bolted to the forward end of the engine crankcase and is then sufficiently far back so it will not be injured when the truck runs into an obstruction. On other trucks, however, the starting crank is carried by brackets under the front cross member of the frame, and in this case the starting crank, when in its operating position, is the most forward portion of the truck, and hence is easily injured. In that case it is necessary to give the crank a folding swiveling form, and fold it out of the way when not in use. On the Transport truck the crank can be swung around through an angle of 90 deg. and locked in both the working position and the position of rest by means of a spring latch.

The brackets and fittings of truck frames are gradually getting neater, and quite a technique is developing in motor truck design of such parts. Some trucks are fitted with channel steel bumpers whose ends are curved slightly backward, and in that case the spring horns are formed with projections which accurately fit into the bumper channel. Combination brackets save on machining and are used largely for the forward ends of truck frames. An example of this is found on the Selden trucks. A single casting serves as a spring bracket, bumper bracket, radiator guard bracket and radiator supporting trunnion.



Method of attaching headlights to radiator on Ward-La France



The Clydesdale headlights, bolted to the radiator, are pyramidal in form, with an octagonal truck

There is considerable variety in the design of steps. The most common practice is to use two pressed steel hangers, and either a wooden or embossed metal step. On the Ward La France truck the step is made of pressed steel and forms an integral part of the front fender.

Much attention has been paid to attaching the rear springs to the frame. The Clydesdale mounting has been designed to provide against torsional stresses on the frame side bars due to the overhang of the springs. The spring brackets and the bracket for the forward end of the radius rods are in one piece.

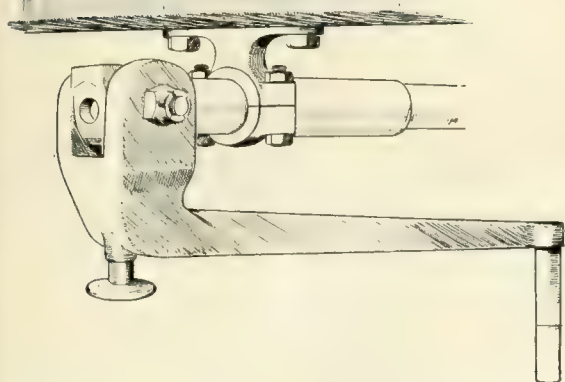
The radius rod forward ends are pivoted on the ends of a round crossbar about 8 in. below the frame rail, and in addition there is a channel-shaped cross member, with its open side down and with its top even with the top of the side rail.

### Attention to Lubrication

Much attention has been given in recent years to the subject of chassis lubrication, and many trucks exhibited at the show were provided with either the Alemite system of grease lubrication or with a wick oiling system. On the Transport truck, for instance, the spring bolts are provided with an oil chamber at the outer end, into which extends a wick which passes through a slot in the

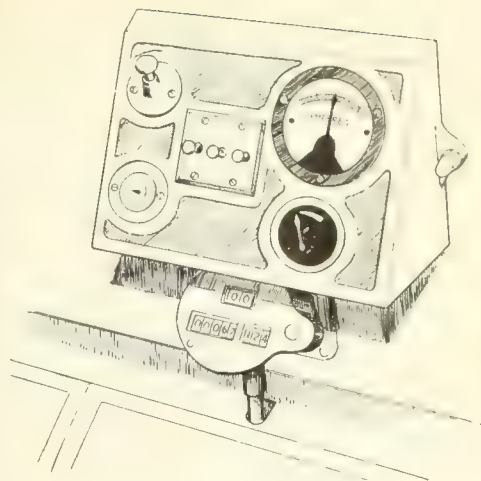


The  $3\frac{1}{2}$ -ton Kelly-Springfield truck uses a new type of internal gear-driven rear axle of Clark design. From the differential housing extend the jackshafts which do not have the usual tubular coverings, but instead carry drums for the service brakes on both sides of the housing



Left—The starting crank on the Transport can be swung around to angle of 90 deg. and locked by a spring latch

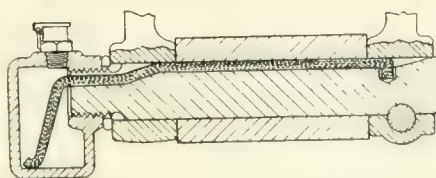
Right—The neat instrument panel secured to the dashboard of the Clydesdale truck. The panel is slanted to give good vision



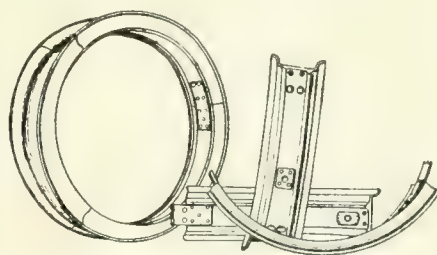
bolt, extending for practically its entire length. On the 3½-ton Transport model, these wick oilers on the spring bolts are intended not only to lubricate the spring bolts themselves but also the spring leaves.

Though it has been on the market for some time, the Christensen carburetion principle air starter for truck engines presents much of interest that is worth retelling. This starter is unique in principle. It consists of an air compressor, an air tank or bottle, air distributor leading the compressed air from the bottle through the cylinders in firing order. As the air passes through the distributor it picks up a rich charge of fuel, and this charge being injected into the cylinders in firing order, insures a prompt start as the spark fires the rich incoming mixture. The maker is the Christensen Engineering Co., Milwaukee, Wis.

The design of the Copithorn truck type of demountable rim for pneumatic tires, which was on exhibition at the show, is noteworthy. This rim, as the maker explains it, is removed from the



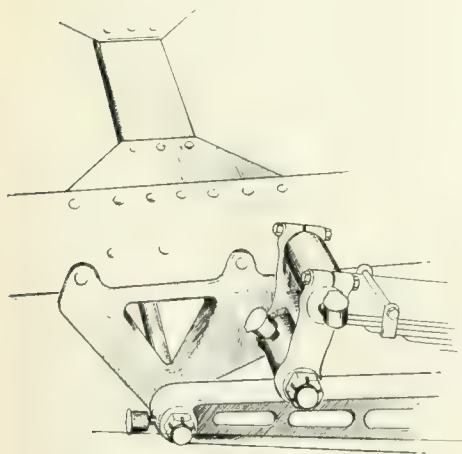
The wick-fed spring bolt used on the Transport truck



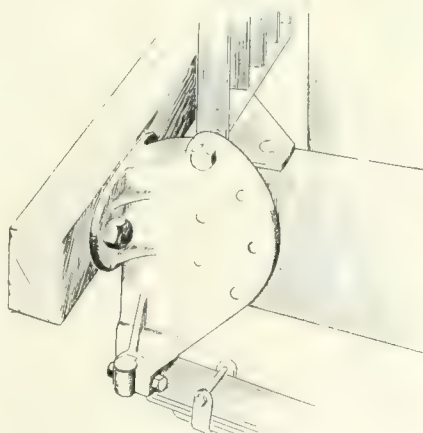
Tire removal is made easy with the sectional Copithorn truck type of demountable rim

tire, not the tire from the rim. This rim is made in three sections, which are held in place by two slotted steel bands, the tapered slots of which slide under the heads of the gooseneck bolts by means of the action of the locking wedge. The removal of the rim from the wheel is accomplished by first loosening the locking wedge, then tightening the wedge on the opposite side of the wheel, thus sliding the rings in the opposite direction and releasing the slotted steel bands from the wheel. The entire time to either mount or dismount a rim from the wheel requires about one minute, according to the maker.

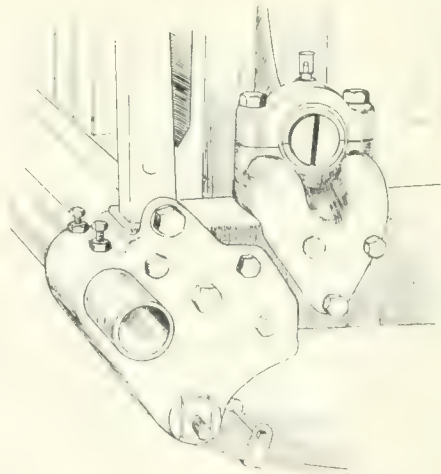
To mount a Copithorn truck type demountable rim upon a wheel, the rim is placed over the felloe band in the usual manner. Then the two slotted steel bands are placed on the wheel, the tapered slots sliding under the heads of the gooseneck bolts by means of the action of the locking wedge, and are thus held firmly in place. This operation is all that is necessary to secure the complete fastening of the rim to the wheel with ten bolts.



The Clydesdale spring mounting which provides against torsional stresses on the frame side bars



Wooden bumper used on the Indiana trucks. This bumper is similar to that on the class B war truck



Combination bracket used on Selden for springs, bumper, radiator guard and radiator supporting trunnion



# Two Trucks Earn \$9500 a Year

*By Including Administrative Overhead in Truck Costs. One Haulage Company Can Tell at a Glance Its Net Profits for the Month or Year—Can You?*

**D**OES your system for keeping costs on your trucks tell you the truth about your net profits? If your system is complete, it should do so. And if it does not, you may be heading for trouble.

Net profits are elusive things in any business. But they are particularly so where the business income depends upon the operation of trucks—such as a public haulage company. Many a young trucking concern with a promising looking gross income, has gone on the rocks because its truck cost keeping system was incomplete or non-existent—and because its actual net income therefore remained a mystery.

Of course there are other reasons for failure in trucking. But given the selection of a reasonably adequate and reasonably steady market, there is a good net income to be made in public haulage—if the system of keeping costs on the trucks is complete and properly kept.

Here is an example of how it should and can be done. Sauer Bros., Milwaukee, Wis., operate two 2½-ton Selden trucks chiefly for hauling steel under contract for the Joseph T. Ryerson company, the largest jobbers of iron and steel in the world.

## Two Types of Haulage

The Selden trucks run all over the city of Milwaukee, starting at 7 o'clock in the morning and running steadily until 5 o'clock in the afternoon. They often make trips to North Milwaukee, Wallis and Bayview. Throughout the year they average five trips per day and four stops per trip.

On the Ryerson work, the total hauled by one truck during a single month is 300 tons. This work leaves about five idle days in each month for each truck. These five days the trucks are occupied in hauling for the American Express Co.

But aside from the question of a steady market, there are two important features of the actual operation and maintenance of the trucks which have largely contributed to their financial success. The first of these is the reduction of annual repairs to a minimum, which is accomplished by an excellent inspection and oiling system. The second is the inclusion of the administrative overhead expense when estimating truck costs, so as to arrive at a figure closely approximating the actual overall cost of operating the trucks.

On the opposite page are shown the cost figures on each of the two trucks,

laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. The cost figures shown cover a period of 5 months for each truck.

As an inspection of the figures will show, the two trucks operated under almost exactly similar conditions. Each truck operated 129 days, made 645 trips and carried 1935 tons. But truck No. 8 covered only 6000 miles while truck No. 10 traveled 7000 miles. Thus, although such items as driver's wages, garage rent, interest, insurance, etc., remain the same; items based on mileage, such as gasoline, depreciation, etc., are somewhat higher for truck No. 10.

When the ultimate costs are estimated for each truck, this brings out some interesting comparisons. The total costs for the 5 months on truck No. 8 totaled

## Pity the Blind!!

What do Truck Costs mean to you?

Do you realize that they are the eyes of your business?

That if you do not know what your trucks cost you, you are "Going it in the dark?"

A complete cost keeping system, properly kept is essential to success.

## Is Your Business Blind?

only \$1810.22 while for the same period, truck No. 10 cost \$1888.30. In the same way, No. 8 cost \$14.03 to operate per day, while No. 10 cost \$14.64 per day, an increase of about 4 per cent per day for a mileage increase of 16 2/3 per cent.

On the other hand, truck No. 10 delivered a total of 10,449 ton-miles while truck No. 8 made only 9030 ton-miles for the 5 months. Thus the cost per commercial ton-mile for No. 10 was only 18 cents, while the cost per commercial ton-mile for No. 8 was 20 cents, although the latter truck did not cost so much for the period.

Thus, in this case at least, a mileage increase of 16 2/3 per cent, other things being equal, has increased the total cost about 4 per cent, but has reduced the cost per ton-mile 10 per cent. In the same way, the cost per mile operated is re-

duced from 30 cents for truck No. 8 to 27 cents for truck No. 10, a reduction of 10 per cent again.

## Actual Profits Shown

By dividing the total cost for the period (Item 14) by the tonnage (Item 8) the cost per ton hauled works out at 97½ cents for truck No. 10 and 93½ cents for truck No. 8. This is an average cost per ton hauled of 95½ cents. These figures are given at the bottom of the right hand sheet for each truck.

It should be remembered that all these figures include a reasonable charge for administrative overhead. Thus, the figures may be taken as reasonably representative of the actual cost of hauling 13,000 tons over a period of 5 months. The administrative overhead item is shown at the bottom of the left hand sheet for each truck, on the blank line included in the cost sheets for just such items, for the convenience of truck operatives.

## Gross Income \$18,360 a Year

The income of Sauer Bros. from haulage undertaken for the Joseph T. Ryerson company, is \$2 per ton hauled. On the Ryerson work, the total hauled for 1 month by one truck is 300 tons. At \$2 a ton, this brings in an income of \$600 a month for each truck, or \$1,200 a month for the two. But Sauer Bros. are paid extra when the trucks operate outside the city for Ryerson, so that the total income from the Ryerson contract averages about \$1350 per month. This extra \$150 takes care of the additional cost per ton on truck No. 10.

But during 5 days a month, the trucks are earning \$2 per hour, 9 hours a day, hauling for the American Express company. This is a total of 45 hours, making \$180 for the two trucks.

Adding this to the \$1350 gives a total income of \$1530 for the two Seldens. This is an income of \$7650 for the 5 months, or at the rate of \$18,360 per year.

Since the combined operating cost of the two trucks, including administrative overhead, is \$3698.52 for the 5 months' period, the total net profit on the two trucks for the 5 months' period is \$3951.48.

On this basis, the total cost for the two trucks for the year would be \$8878.45. Thus the total profit for the year works out at \$18,360 minus \$8878.45, or \$9481.55, a very fair profit for a fleet of two trucks.

The Commercial Vehicle—Truck Cost System

5 Month's ending November 30 1920

Make of truck Selden (#8) Gasoline

MONTHLY COST SUMMARY SHEET U. P. C. BOOK COMPANY, INC. 243 248 WEST 30TH ST. NEW YORK

Operating Charges

Gasoline	750 gals.	@ \$ .30	\$ 225 75
Current	— kw/h	@	
Oil	64 1/2 qts.	@ \$ .12	8 39
Grease	— lbs.	@	
Kerosene	— gals.	@	
Waste	— lbs.	@	
Dish Water	— gals.	@	
Driver	129 days	@ \$ 5.00	645 00
Helper	— days	@	
Mechanic	— hrs.	@	

A—Total Operating Charges 879.14

Maintenance Charges

*Tires	6000 miles	@ \$ .0187 (14500 mile life)	\$ 112 20
Repairs	—	Estimated	169 75
Overhauling painting, etc.	—	—	
Spare vehicle rental	—	—	
Garage rental (pro rata)	@ \$4.40 per month		22 00

B—Total maintenance charges 304.15

Fixed Charges

Insurance, fire	—	per year	\$ 75 00
Liability	@ \$180.00	per year	
Collision	—	per year	
Interest	6	(On item 1—1000) for five months	83 94
Depreciation on chassis	—	—	
Depreciation on body	@ \$ .0344 (90000 mile life)		206 40
Depreciation on equipment	@ per mile		
Depreciation on tires	—		
Total taxes and licenses	@ \$8.75 per year		36 98
Administrative overhead	@ \$39.06 per year		224 61

C—Total fixed charges 626.93

\*Note: Omit one of these

1810.22

The Commercial Vehicle—Truck Cost System

Number of Truck 5

Capacity in lbs 5000

MONTHLY COST SUMMARY SHEET U. P. C. BOOK COMPANY, INC. 243 248 WEST 30TH ST. NEW YORK

Investment

Cost of chassis, less tires	\$ 277 70
Cost of body	17 50
Cost of equipment	262 30
Cost of tires	2 357 10

1—Total cost, complete 5357.10

Performance Record

2—Days operated	129
3—Days idle	27
4—Days maintained (Item 1—Item 3)	53
5—Total hours operated	270
6—Total miles covered	270
7—Total tons made	270
8—Total tons of packages or stops	270

Performance Averages

9—Average miles per day maintained (Item 1—Item 3)	51.2
10—Average miles per day operated (Item 6—Item 7)	26.5
11—Average miles per trip (Item 6—Item 7)	1.3
12—Average tons, packages or stops per trip (Item 6—Item 7)	3
13—Average commercial ton miles, package miles or stops miles per trip (Item 1—Item 3)	4

Recapitulation

14—Total expenses for month (Sum of Items A, B and C)	\$ 1510.22
15—Cost per day operated (Item 14—Item 2)	14.03
16—Cost per day maintained (Item 14—Item 4)	11.84
17—Cost per mile operated (Item 14—Item 6)	.322
18—Total commercial ton-mile, package-mile or stop-mile (Item 7xItem 13)	270
19—Cost per commercial ton-mile, package-mile or stop-mile (Item 14—Item 18)	2.004

Cost per ton hauled (Item 14—Item 8) \$9.35

These are the cost figures for No. 8 truck, laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. The cost per ton hauled by this truck is 93 1/2 cents, including overhead. But the company received about \$2 for each ton hauled

The Commercial Vehicle—Truck Cost System

5 Month's ending November 30 1920

Make of truck Selden (#10) Gasoline

MONTHLY COST SUMMARY SHEET U. P. C. BOOK COMPANY, INC. 243 248 WEST 30TH ST. NEW YORK

Operating Charges

Gasoline	833 gals.	@ \$ .30	\$ 250 73
Current	— kw/h	@	
Oil	64 1/2 qts.	@ \$ .12	8 39
Grease	— lbs.	@	
Kerosene	— gals.	@	
Waste	— lbs.	@	
Dish Water	— gals.	@	
Driver	129 days	@ \$ 5.00	645 00
Helper	— days	@	
Mechanic	— hrs.	@	

A—Total Operating Charges 904.12

Maintenance Charges

*Tires	7000 miles	@ \$ .0187 (14500 mile life)	\$ 130 90
Repairs	—	Estimated	169 75
Overhauling painting, etc.	—	—	
Spare vehicle rental	—	—	
Garage rental (pro rata)	@ \$4.40 per month		22 00

B—Total maintenance charges 322.85

Fixed Charges

Insurance, fire	—	per year	\$ 75 00
Liability	@ \$180.00	per year	
Collision	—	per year	
Interest	6	(On item 1—1000) for five months	83 94
Depreciation on chassis	—	—	
Depreciation on body	@ \$ .0344 (90000 mile life)		240 80
Depreciation on equipment	@ per mile		
Depreciation on tires	—		
Total taxes and licenses	@ \$8.75 per year		36 98
Administrative overhead	@ \$39.06 per year		224 61

C—Total fixed charges 661.33

\*Note: Omit one of these

1888.30

The Commercial Vehicle—Truck Cost System

Number of Truck 6

Capacity in lbs 5000

MONTHLY COST SUMMARY SHEET U. P. C. BOOK COMPANY, INC. 243 248 WEST 30TH ST. NEW YORK

Investment

Cost of chassis, less tires	\$ 277 70
Cost of body	17 50
Cost of equipment	262 30
Cost of tires	2 357 10

1—Total cost, complete 5357.10

Performance Record

2—Days operated	29
3—Days idle	27
4—Days maintained (Item 1—Item 3)	53
5—Total hours operated	270
6—Total miles covered	270
7—Total tons made	270
8—Total tons of packages or stops	270

Performance Averages

9—Average miles per day maintained (Item 1—Item 3)	51.2
10—Average miles per day operated (Item 6—Item 7)	26.5
11—Average miles per trip (Item 6—Item 7)	1.3
12—Average tons, packages or stops per trip (Item 6—Item 7)	3
13—Average commercial ton miles, package miles or stops miles per trip (Item 1—Item 3)	4

Recapitulation

14—Total expenses for month (Sum of Items A, B and C)	\$ 1588.30
15—Cost per day operated (Item 14—Item 2)	14.03
16—Cost per day maintained (Item 14—Item 4)	11.84
17—Cost per mile operated (Item 14—Item 6)	.322
18—Total commercial ton-mile, package-mile or stop-mile (Item 7xItem 13)	270
19—Cost per commercial ton-mile, package-mile or stop-mile (Item 14—Item 18)	2.004

Cost per ton hauled (Item 14—Item 8) \$9.35

The cost figures on No. 10 truck are slightly higher, although the truck is the same capacity as No. 8, 2 1/2 tons. In this case the cost per ton hauled was 97 1/2 cents, but as the truck ran greater distances for the same tonnage, as the mileage shows, the company received more than \$2 per ton



# The Battle Against Snow

## 10—Weapons of the Future

### Machines Which Help Eliminate Costly Manual Labor

*Machines May Be Classified as Mechanical Loaders; Rotary Plows to Blow Snow off the Road; Devices for Melting Snow on the Ground and Others to Melt It After Removal*

THE great increase in the use of roads of the United States as industrial arteries has developed along with the development of the truck and is almost as recent. But the crying need for keeping the roads open and clear of snow is, therefore, about as recent, so that the snow fighters have but few seasons of experience on which to base their future campaigns.

Up to the end of 1919 the snow fighting forces in the big cities in the Northern states and in country districts were equipped for the most part with only the most ordinary snow fighting devices, such as hand shovels and pull and push plows, the push plows attached to the front of trucks and the pull plows either dragged by horses or mules or towed by trucks.

However, last winter's snow fighting campaign marked the beginning of the development of more highly specialized snow fighting equipment; equipment designed, as was the specialized equipment in France, to do the greatest amount of damage and sweep away the greatest quantity of the enemy with the least expenditure of man power.

Thus, the new snow fighting equipment is designed to save both time and labor. But as regards its method of operation and application it can be divided under four general heads, which will be treated in turn in this article.

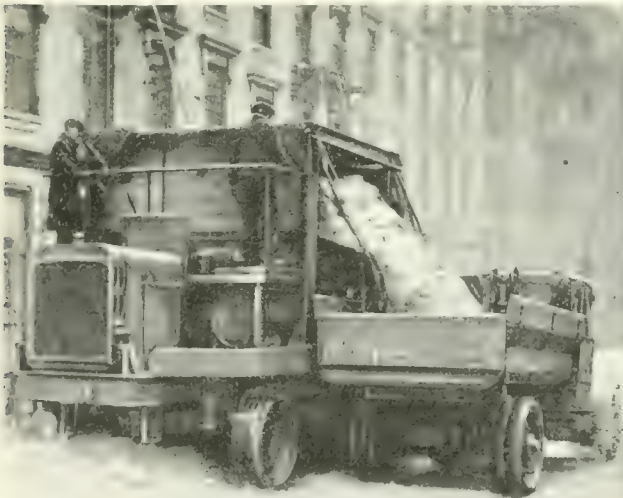
#### The Mechanical Loader

The first type of snow fighting machine is the mechanical loader. Two different types of mechanical loaders were developed, manufactured and applied during the snow campaign last winter, one in New York and the other in Chicago. The machine used in New York and shown on the left below is the snow and ice removing machine invented by Dr. Samuel Friedman and called the Friedman Snow Tank. This machine consists of a very powerful four-wheel driven chassis on which is mounted an endless chain conveyor that carries buckets and teeth. As the machine is moved by its own power the conveyor is driven and carries the snow and broken ice upward into a hopper or bunker from which it may be continuously or intermittently discharged.

The chassis is very heavily built with a Sterling 6-cylinder marine engine as a

powerplant and the drive is the Christie patent, a type developed by Walter Christie for fire apparatus, tractors, etc. The engine is rated at 150 hp. The whole apparatus is 26 ft. long, 9 ft. 6 in. wide, 12 ft. 6 in. high, and weighs approximately 22 tons. The power transmission gearset has four forward speed ratios and reverse and the speed of the machine may be from 2 to 10 miles an hour. When working the machine will clear a path of snow at the following speeds: 6 in. depth at 8 miles an hour; 8 in. depth, 7 miles an hour; 12 in. depth, 5 miles an hour; 18 in. depth, 3 miles an hour, and 24 in. depth, 2 miles an hour. The machine dumps snow from the bunker into trucks, which pull alongside.

The other mechanical loading machine, used in Chicago, is on somewhat the same principle. It consists of an endless belt slanted at an angle of about 35 degrees with one end on the ground. This end is equipped with a wide scoop to gather in the snow. The belt is of rubber, 32 in. wide, and is fitted with cross angle flights or cleats every 20 in. and driven by a roller chain running in steel track angles attached to the belt on either side, making it positive drive. It has 12 in. skirt boards on either side.

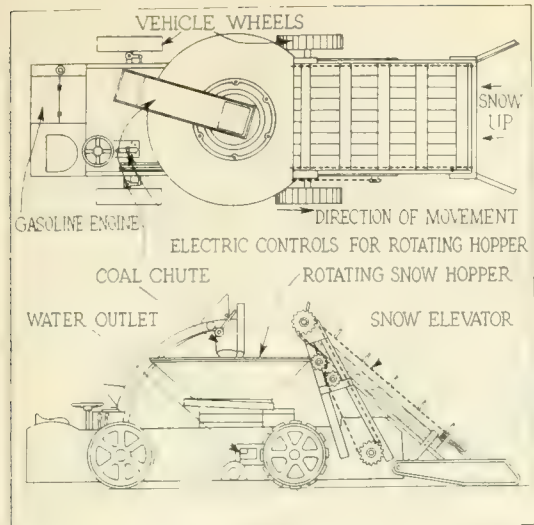


*The Friedman Snow Tank in action, showing how the snow, after being scooped up at the front of the machine, is dumped into a truck at the side*



*The snow shovelling device tried out in Chicago during last winter's storms. This machine pushes into the snow, scoops it up onto the travelling belt and deposits it on a truck*





Another type of snow fighting machine. This is a combined snow scoop and snow melter, driven by a gasoline engine

A side view of the Fennia Snowmelter, showing how, after the snow has been melted in the interior of the machine, the water, sand and dirt pass out through a chute at the side

The whole device is mounted on a small tractor and the upper end of the belt extends out beyond this tractor sufficiently to allow it to dump into a truck driven up behind the tractor. This machine is shown on the right at the bottom of page 12. The approximate price is \$6,000.

Rotary Snowplows

The second type of specialized equipment is the rotary snowplow. A sketch of one of the more interesting types developed is shown in the third illustration on page 14. This is a track-laying rotary plow developed by D. L. Ellis, Seattle, Wash. The plow is designed to cut a 9-foot swath through a snow bank or through deep snow and to discharge it through a revolving chute at the top. By adding an extension to this chute the snow could be dumped into trucks pulling up at the side. An estimate made several months ago based on quotations for

The Fight Against Snow

Is Being Taken Up in a Series of Twelve Articles in

THE COMMERCIAL VEHICLE

- 1—Snow Costs Money...Sept. 1
- 2—Clearing City Streets...Sept. 15
- 3—Clearing Country Roads...Oct. 1
- 4—The Fleet Owner's Part...Oct. 15
- 5—The Tools of Battle...Nov. 1
- 6—Pioneers of the City...Nov. 15
- 7—State Highway Work...Dec. 1
- 8—Use of the Tractor...Dec. 15
- 1921
- 9—Giant Pneumatics Help...Jan. 15
- 10—Weapons of the Future...This Issue
- 11—Ounce of Prevention...Feb. 15
- 12—The Weather Man...Mar. 1

Snow Is a National Problem

generators, motors, caterpillar tracks, etc., showed a total cost of approximately \$35,000 for the entire machine. The illustration on page 14 shows the construction in detail.

Melting Snow on the Ground

The third type of specialized apparatus is that designed to melt the snow on the ground. Several different devices of this nature are shown in the illustrations on this and on the following pages (13 and 14). There are two distinct types. The first is the snow melter into which the snow is shoveled. The Fennia Snowmelter is a good example of this type. It consists of a welded furnace of sheet iron, water jacketed to prevent damage by heating and to avoid radiation. The snow is shovelled into the big funnel at the top and is melted by streams of hot water and by the central heat. The melted snow, dirt and sand are expelled (Concluded on page 29)

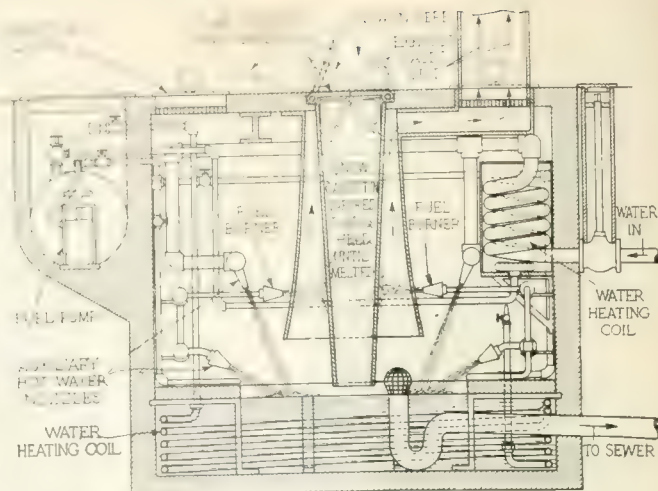


A smaller edition of the Fennia Snowmelter. The snow is shovelled by hand into the hopper



A good view of the hopper of the Fennia Snowmelter, showing how streams of water play upon the snow from all sides. The central core is also heated and helps melt the snow

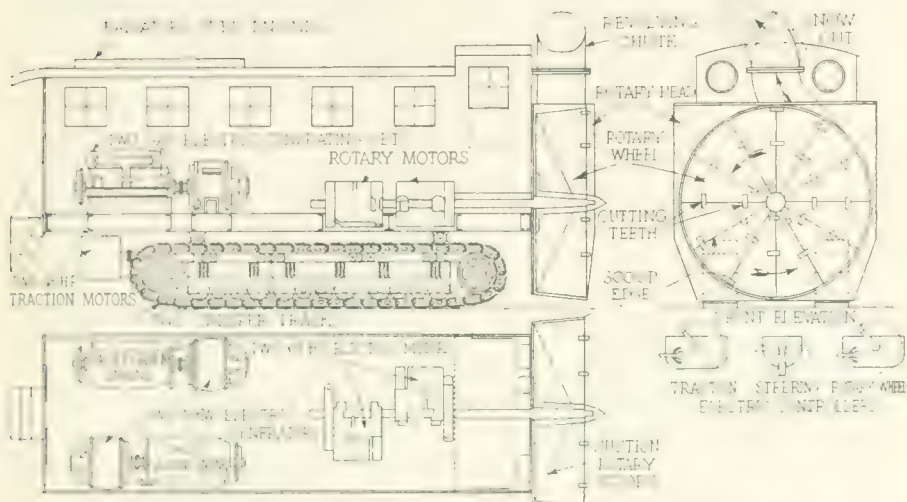




## Apparatus for Snow Removal

Upper left, an oil burning snow melter of doubtful economy as mounted in place of a plow on the front end of a large tank truck

Upper right, an underground chamber to melt snow before it is passed into the sewers. It is the invention of P. Connolly, Dumont, N. J., and prevents the sewer from becoming clogged with refuse such as broken umbrellas, etc.

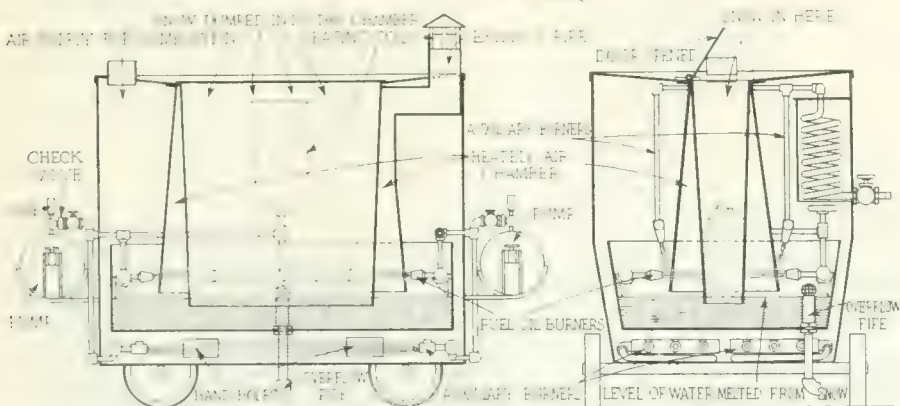


At the left, above, a novel track-laying rotary plow developed by D. L. Ellis, Seattle, Wash. This plow is designed for country road work where the snow may be blown to the sides of the road

At the left, below, a portable snow melting device designed by P. Connolly, Dumont, N. J.

Lower left corner, a Winther four-wheel-driven truck with locomotive type plow used by the Milwaukee Electric Co., to keep country roads open

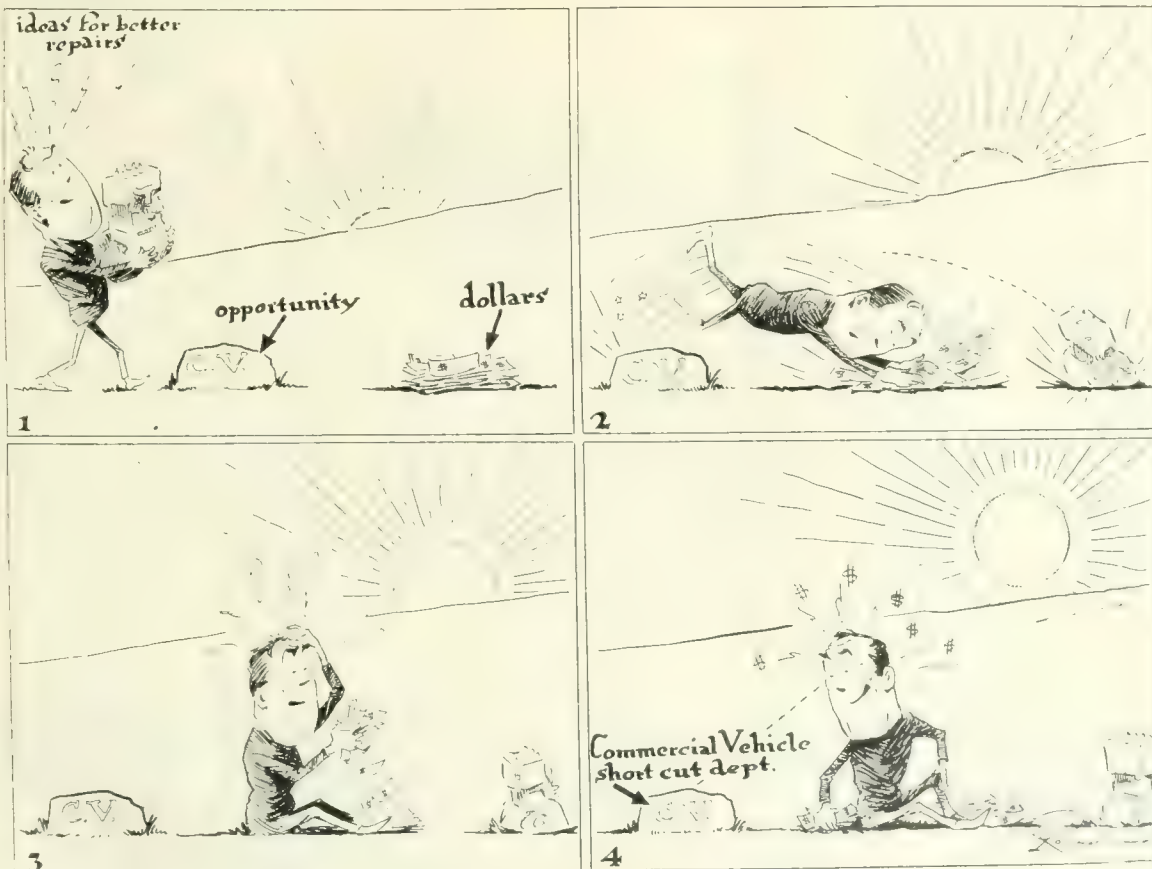
Directly below, a small Cletrac tractor with inclosed driver's cab and plow as just put into service in New York City's battle against snow



# THIS

*Is One of Those Opportunities—  
That People Are Always—  
Writing About—  
In the Magazines—*

## We Want Ideas for Better, Quicker Truck Repairs



*Send Us Your Ideas and We'll Send  
You Our Money. One Dollar for  
Each Sketch and Short Description*

THE COMMERCIAL VEHICLE  
239 West 39th Street  
New York City



# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 361—Increasing Wristpin Bearing Surface

WHEN it becomes necessary to install a new wristpin bushing, it is a comparatively simple matter to ream the bushing to a driving fit, drive it into its place and then drive in the wristpin. But unlike the big end split bearing, which can be scraped to a perfect bearing surface, this smaller bearing will not always have a perfect bearing surface. Therefore it will tend to wear down the "high spots" and so wear to a loose fit. This can be prevented by the method shown in the accompanying illustration. After reaming the bushing to a driving fit, the pin is inserted and the assembly clamped in a vise. The connecting rod is then peened with a light hammer.—A. G. RAABE, Long Island City, N. Y.

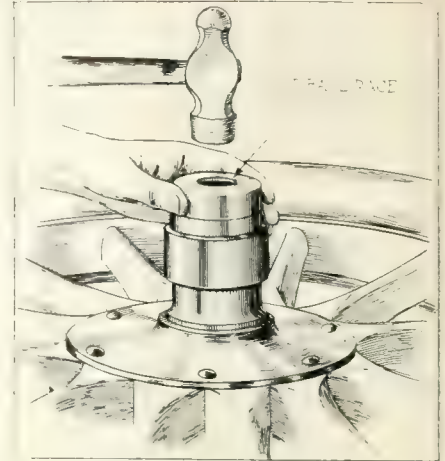
## No. 362—Home-Made Emery Wheel

A HIGH speed emery wheel proves of value on many occasions and in many kinds of work in the average truck repair shop. In shops where such a wheel is not available or in cases where the wheel is in use or where some special type of work is to be done, requiring a different type of wheel, such an emery or grinding wheel may be home-made in the manner shown in the accompanying illustration. Cut out on a lathe, if possible, a round section of wood and cut a V in it as shown. Then wrap a piece of

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

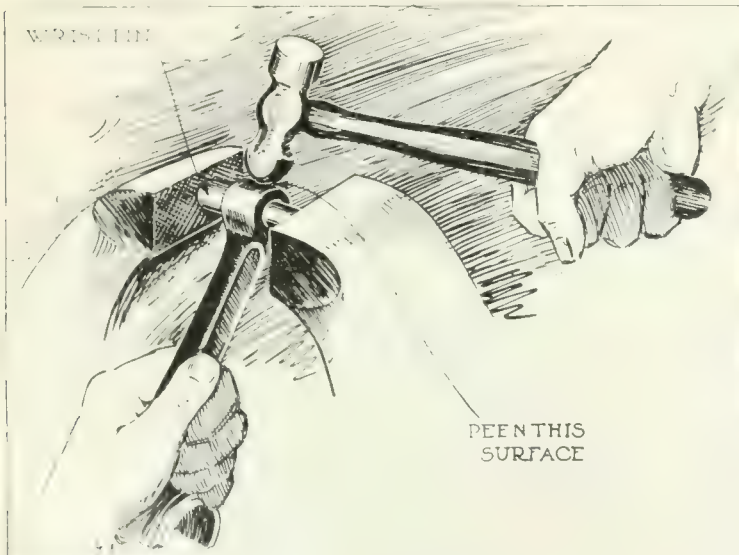
emery cloth, cut the width of the wheel, about the latter and fasten it in place with a wedge. Although the manufactured article will prove more satisfactory, this home-made device is also useful.—ALLEN E. TOWN, St. Cloud, Minn.



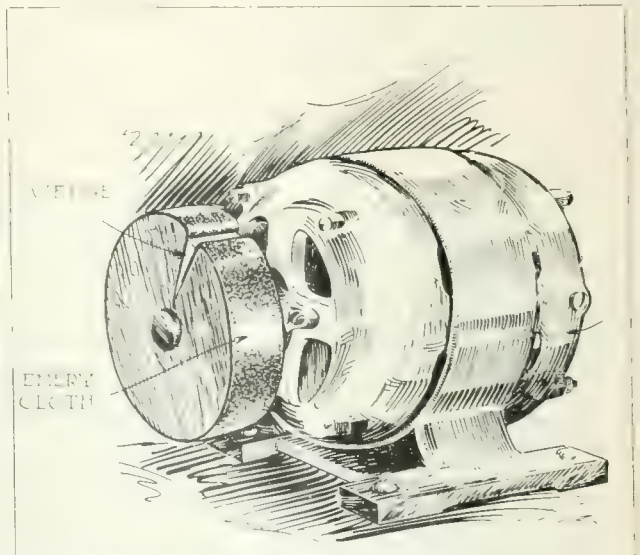
• No. 363—Replacing Ball Race

## No. 363—Replacing Old Ford Ball Race

IT is a somewhat difficult operation, as a rule to fit a new ball race onto a Ford front wheel spindle without damage to the ball race. This can be accomplished however, by the method shown in the accompanying illustration. Place the new ball race in position. Then take the old race which has been removed, reverse it and put it above the new ball race. A few light taps with a hammer will then serve to drive on the new ball race.—A. E. DAILEY, Eveready Garage, Chester, Pa.



No. 361—Peen Connecting Rod

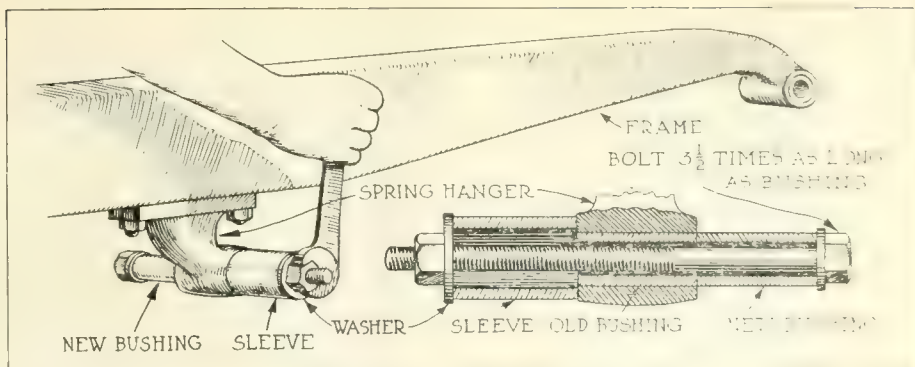


No. 362—Home-Made Emery Wheel



### No. 364—Replacing Worn Spring Hanger Bushing

**A**N easy method of replacing a worn spring hanger bushing, accomplishing the removal of the old bushing and the installation of the new in a single operation, is shown in the accompanying illustration. The principal requirement is a bolt about  $3\frac{1}{2}$  times as long as the bushing, and a sleeve a little longer than the bushing and with an interior diameter slightly larger than the exterior diameter of the bushing. The bolt should be threaded about two thirds of its length. The new bushing is slipped on the bolt up to the head and the threaded end of the bolt is slipped through the old spring hanger bushing. The sleeve is then slipped onto the projecting end of the bolt and fastened on with a washer and a threaded nut. Taking up on this nut will now force the new bushing into place, this bushing forcing out the old bushing into the sleeve at the same time. Thus the two operations are accomplished at the same time and without damage to any of the parts involved.—WM. KINDERMAN, International Harvester Co. of America, Harrisburg, Pa.



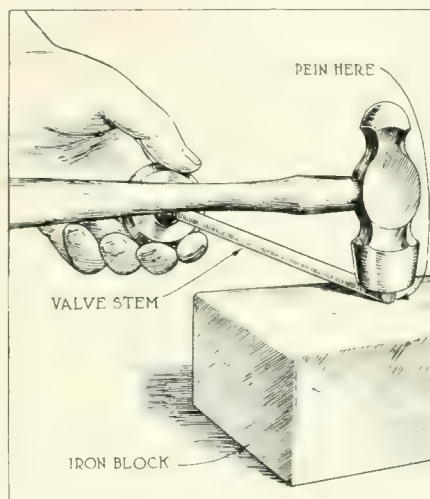
No. 364—New Hanger Bushing

license plate are visible but out of the way.—GEORGE GOMERSALL, 192 Water Street, Brooklyn, N. Y.

### No. 366—Scraper Made From Old File

**E**VEN when the tool equipment of a truck repairshop is ample to take care of the average repairs from day to

among the mechanics. In such cases it may be well to have on hand a few extra tools which can be used effectively in a pinch, but which do not tie up capital in unused tool equipment. An example of this type of spare tool is shown in the accompanying illustration. It is simply an old, worn-out file of the triangular type. The worn sides have been ground down until the roughness is worn off and the edges have been sharpened to a razor edge. Ground in this way, the file will prove almost as effective as the regular bearing scraper, for work on babbitt bearings such as the big end, bearings, etc.—ROBERT L. BROWN, 42 Eagle Rock Ave., West Orange, N. J.

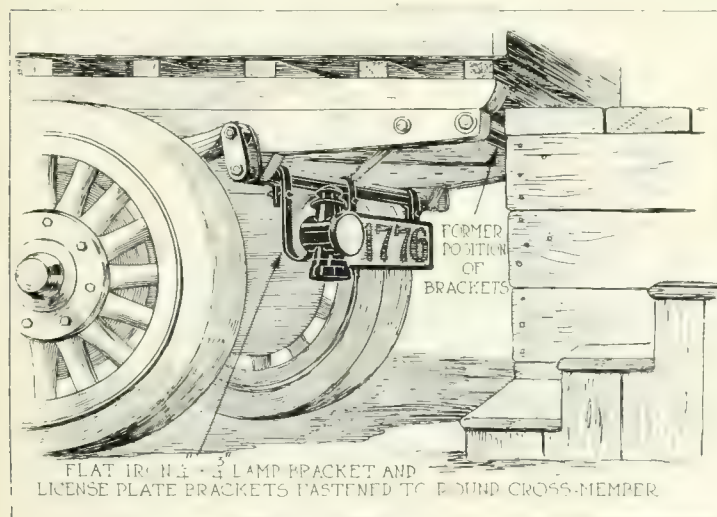


No. 367—Correcting Clearance

day, it sometimes happens that a rush of repairs of a similar type will find the tool equipment insufficient to distribute

### No. 367—To Correct Ford Valve Clearance

**A**FTER some little service the valve stems on the motor of a Ford truck will sometimes become very noisy and also out of time. This is due to improper valve lift, owing to the fact that there is too much clearance between the valve and the tappet. A very simple way to overcome this difficulty is shown in the accompanying illustration. Place the end of the valve stem on an iron block and stretch it by peining it with a hammer, below the valve spring pin hole. This method is simple and will often save the cost of a new valve.—WALTER F. DAASCH, Davenport, Iowa.

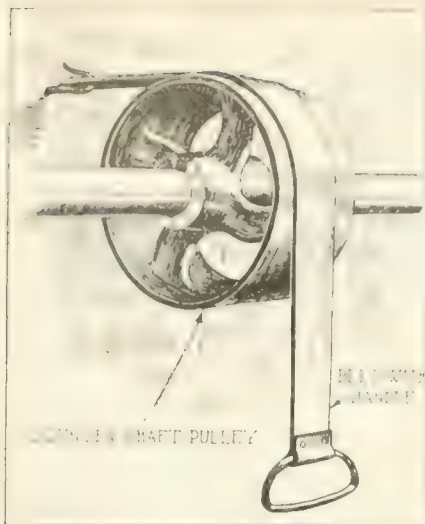


No. 365—Save Tail Lamp



No. 366—Home-Made Scraper





No. 368—Safety Brake

### No. 368—Safety Brake for Countershaft

IN common shop practice in truck repairshops where a number of power driven tools are used, countershafts and similar power transmitters are allowed to revolve freely after the belt is thrown off. Under these circumstances it is not an uncommon occurrence for the mechanics to attempt to stop them with their bare hands. This practice has resulted in many accidents and will probably result in many more. In the accompanying illustration is shown a simple and inexpensive method to prevent accidents of this kind. A short piece of fairly heavy belting or other material is hung over the countershaft pulley, so that the rotation of the pulley is the same as the belt pulled. A handle is attached to the free end of the belt and the other end is attached to the wall or ceiling to one side of the countershaft. A steady pressure on the handle will thus stop the rotation of the countershaft entirely without risk to the man pulling it. After a certain amount of use, if the belt should start to wear out, pieces of new material can be attached to it in the same way that a new V link is applied to a fan belt.—ROGER MORRIS, Des Moines, Iowa

### No. 369—Connecting Rod Bushings Shortened

HOW an old broken connecting rod can be used for facing off half connecting rod bushings and facing them off straight, is shown in the accompanying illustration. Die cast or machined bronze connecting rod bushings are wider, as a rule, than the crankpin of the crankshaft and therefore require a great deal of filing. These bushings can be faced off quicker on a lathe with an arbor which will fit the bushings to be faced off. For this purpose an old or broken connecting rod of the size to fit the bushings can be used. The illustration indicates the method of facing them off. This method makes the sides of the bushings more perfect so that they will stand up longer than is the case with the filing method. Moreover it can be done in considerably less time in this way. The connecting rod arbor is fastened in the lathe and centered at each end and the cutting tool faces off the end of the bushing.—GEORGE HERON, The Boston Store, Chicago, Ill.

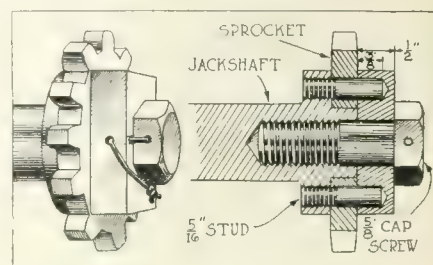
### No. 370—Blind Holes Used for Sprocket Mounting

ON certain makes of electric trucks, the mounting on the jackshaft has four 5/16 in. studs to hold the sprocket to the jackshaft. It sometimes happens that these studs work out and make the 1/2 in. holes in the sprockets and shafts wear out of shape. This also ruins the thread in the jackshaft flange to which the sprocket is attached. These sprockets have four 5/16 in. half round keyways or half holes and the jackshaft has four similar keyways at the pilot and for the sprocket. When the sprocket is attached to the jackshaft, four 5/16 in. round studs are screwed into these 5/16 in. half holes in the flange of the jackshaft, which prevents the sprocket from turning. A nut is fastened on the end of each stud to prevent the sprocket from slipping off the jackshaft. Now these old style studs and nuts may be discarded and the junction made by means of a 2 in. by 2 in. by 1/2 in. plate with four 5/16 in. blind holes. Drill a hole in the end of the jackshaft for a 3/8 in.

S. A. E. cap screw. The pilot end of the jackshaft for the sprocket should be faced off shorter than the thickness of the sprocket, so that the plate clamps the sprocket tight to the jackshaft. New studs should be made with threads on one end only, to screw into the jackshaft flange, and should be made long enough to pass into the holes in the plate. This method holds the studs rigid and makes a successful job. A study of the accompanying illustration will make this new method clear.—GEORGE HERON, The Boston Store, Chicago.

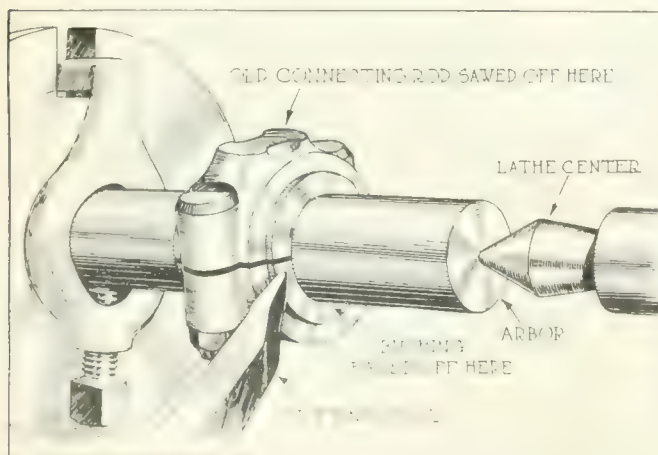
### No. 371—Replacing Worn Wrist Pin Bushing

REPLACING a worn wrist pin bushing with a new one is undoubtedly a comparatively simple operation. But there is a right way and a wrong way to accomplish any repair operation. And in this as in other operations, the short-

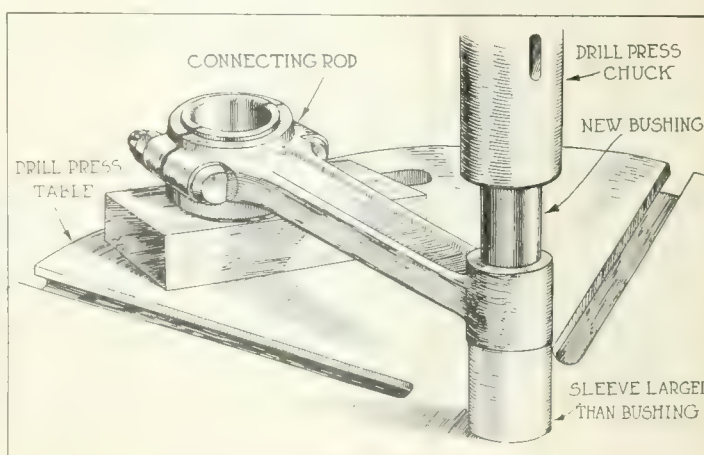


No. 370—Sprocket Mounting

est, most efficient way is the right way. The accompanying illustration indicates a short and efficient method. The only requirement is a sleeve, slightly longer than the wrist pin bushing and with an interior diameter slightly larger than the exterior diameter of the bushing. This sleeve is set on end on the bed of an arbor press or a drill press and the small end of the connecting rod set on top of it, so that sleeve and bushing are concentric. The other end of the connecting rod is supported by means of a wooden block as shown, so as to make the bushing vertical. The new bushing which is to replace the old one is then set in the drill press chuck, or in the case of an arbor press is placed vertically on top of the old bushing so that it is



No. 369—To Shorten Bushing



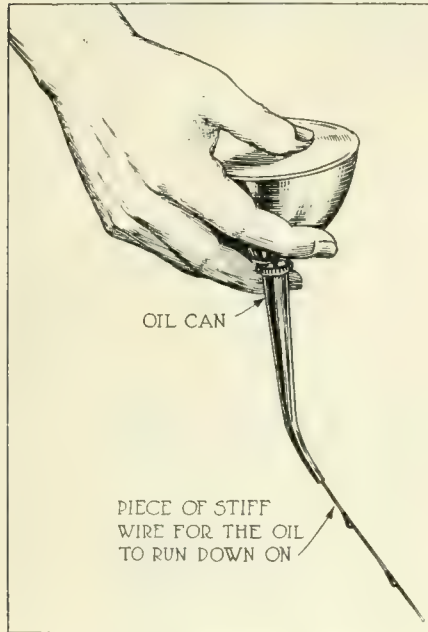
No. 371—To Replace Bushing



concentric with it. Lowering the arbor press or the drill press chuck will now press in the new bushing and press out the old bushing at the same time, making one operation answer for both.—WM. KINDERMAN, International Harvester Co. of America, Harrisburg, Pa.

### No. 372—Temporary Fan or Repair Belt

**H**OW to make a strong and efficient temporary repair belt or fan belt is shown in the accompanying illustration. Take a piece of  $\frac{1}{2}$  in. rope, preferably a 3 stranded piece, a little over three times



No. 374—Lengthen Nozzle

the length of the belt desired. Now unwind one of the three strands of this rope, taking particular care not to stretch the little kinks or curves out of it. Then make a loop, using one third of the length of the strand. This rope will be slack and curved like a corkscrew. Now take the rest of the strand, without cutting it and wind it around the first loop just the same way that an ordinary piece of rope is wound. Do not

pull tight. Continue the process until the strand has been wound three times, including the first loop, so that each successive loop fits into the curves left by the last and the completed job is a three stranded loop the length desired. All that is now necessary is to wind a little twine around the place where the ends of the strand finally meet.—J. F. BALDWIN, The Atlantic Refining Co., Philadelphia.

### No. 373—Try This Method to Keep Tools Clean

**T**OOLS and spare parts which are not nickeled are almost always found to be coated with rust when withdrawn from a stock room where they have lain idle for any length of time. The accompanying illustration indicates a method to avoid the dirt, inconvenience and actual damage to tools and spares which are caused by this rust. If not already on hand in the shop, purchase a small tube of Prussian Bearing Blue and put a thin coat of this blue on the tools or spares before they are put away in the bins. This will prevent them from becoming rusty if subjected to a damp atmosphere. When the tools or small spares are to be used, this blue can be easily removed by the use of gasoline.—ROBERT L. BROWN, 42 Eagle Rock Ave., West Orange, N. J.

### No. 374—Lengthening Oil Can Nozzle

**I**F no long nozzle oil can is available in the shop, a good deal of difficulty is sometimes experienced because of the difficulty of getting at and oiling certain parts of the trucks which are less readily accessible. When an oil can with a longer nozzle cannot be obtained, the following short cut may be adopted, as shown in the accompanying illustration. Simply insert a length of stiff wire into the nozzle of the ordinary can and bend it to any angle desired. The oil will then run down the wire and can be applied thus to the inaccessible point. The wire must not, of course, be thick enough to stop up the nozzle altogether.

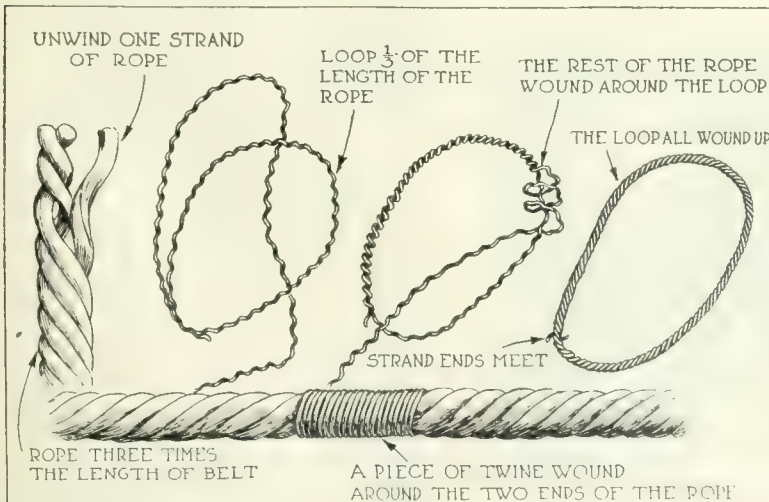


No. 375—To Renew Spring

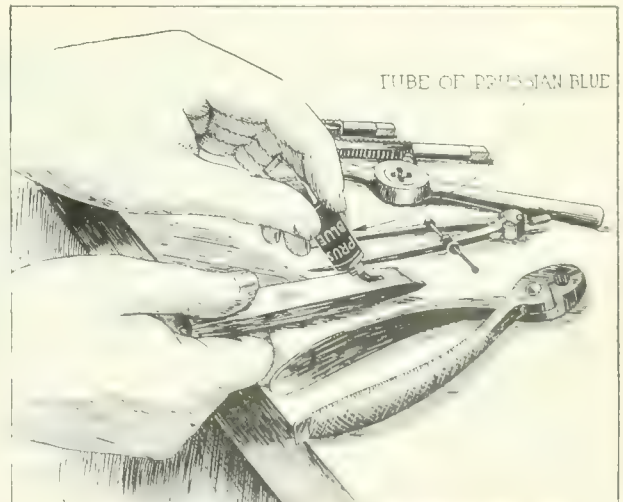
In using this device, the wire will usually remain in the nozzle, but if it is small and shows a tendency to slip out, the tip of the nozzle of the can may be bent slightly, after the wire has been inserted. This will be sufficient to hold the wire inside the nozzle.—JOHN MAHONEY, Ithaca, N. Y.

### No. 375—How to Renew Spring in Oil Can

**H**ERE is a simple method to renew the spring in the bottom of an oil can. Sometimes after a good deal of use, the bottom of the can, which is pressed to force out the oil, will lose its spring, so that the can cannot be used. The spring in the base of the can will be renovated if the following procedure is followed. Remove the nozzle of the can and after inserting in a vise a piece of wood small enough to pass into the oil can, reverse the oil can and place it on this vertical piece of wood. Then twirl the can rapidly, bearing down on it a little at the same time.—HERBERT FARGO, Roanoke, Va.

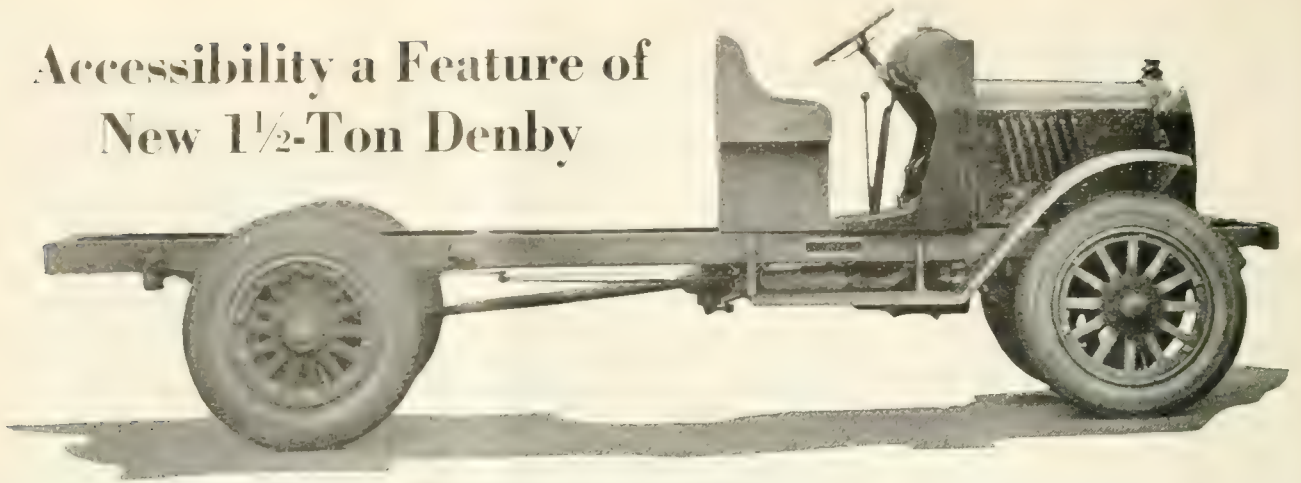


No. 372—Temporary Repair Belt



No. 373—To Keep Tools Clean

## Accessibility a Feature of New 1½-Ton Denby



### DENBY SPECIFICATIONS

Capacity, tons	1½
Price	\$2,400
Wheelbase	136
Tires, front	35 x 5
Tires, rear	38 x 7
Bore, in.	3½
Stroke, in.	5
N. A. C. C. hp.	25
Speed, m.p.h.	25
Speed, m.p.h.	25
Gear ratio in high gear	—
Final drive	Int. Gear

**STURDINESS** and simplicity are the two outstanding features connected with the design of the new internal gear-driven 1½-ton Denby, made by the Denby Motor Truck Co., Detroit. One good example of how the company has planned to simplify the repair operations connected with this new model may be taken in the removal of the rear axle assembly. By removing two spring shackle pins and four nuts, the rear axle assembly, which includes the springs and wheels, can be entirely removed from under the truck. There is a generous use of renewable bushings throughout the general construction.

Improvements in design include specially designed spring clip seats which completely house in the rear springs at the axle, positively preventing any slipping or twisting of springs on the rear axle pad. This is stated to eliminate any danger of the rear axle getting out of line with the other units of the truck.

The company has also included an im-

provement in its brake construction, incorporating a double-acting service brake on the driveshaft, located just to the rear of the gearset at the center bearing. This type of brake eliminates the external-contracting bands on the rear axle drums. It is readily accessible, with no trouble to make adjustments, one wing nut being used to change the tension of the brake. The special spring seat, which eliminates any slippage of the rear axle and the driveshaft brake, increases the dependability and adds to the desirable features of the Hotchkiss drive.

In general appearance, the new model conforms to the lines of the 3-, 4- and 5-ton models. For instance, the hood line has been changed. It has been raised to conform more nearly with the general lines of the larger models. The

ends of fuel tank are more concealed.

Regular equipment includes electric head lamps and dimmer, electric tail lamp and horn, generator and storage battery, bumper, tools, jack and power pump.

The length of the frame back of the seat is 120 in. The width is 34 in., and the body allowance is 900 lb. The truck has a rated speed of 25 m.p.h.

Specifications include a four-cylinder block engine suspended at three points, a Monarch governor driven from the engine, Stromberg carbureter, pressed steel frame, thermo-syphon water circulation through a built-up radiator with cast top and bottom tanks, Eisemann high-tension ignition, three-speed gearset, multiple-disk, dry-plate clutch; propulsion and driving torque through the springs, and steering on the left.

## New Luedinghaus a 1-Tonner

### LUEDINGHAUS SPECIFICATIONS

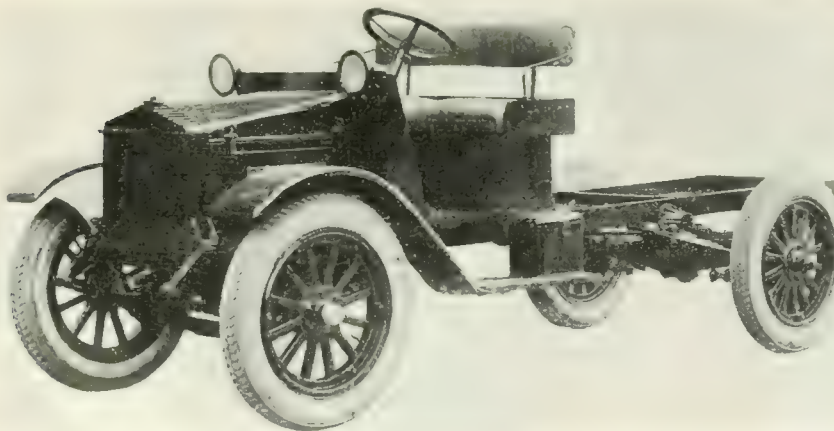
Capacity, tons	1
Price	\$1,950
Wheelbase, in.	130
Tires, front	35 x 5
Tires, rear	35 x 5
Bore, in.	3½
Stroke, in.	5
N. A. C. C. hp.	19.6
Speed, r.p.m.	—
Speed, m.p.h.	—
Gear ratio in high gear	—
Final drive	Worm

**THE** Luedinghaus-Espenschied Wagon Co., St. Louis, Mo., has added to its line of 1½-, 2- and 2½-ton trucks a new 1-ton size. This worm-driven truck has been designed to meet the need for a 1-ton truck of light weight, yet designed to stand heavy duty service and capable of maintaining a speed of about 30 m.p.h.

The selling argument for this new model is economy of operation and sturdiness. The company has for the past 77 years been building transportation vehicles, including the well-known line of Luedinghaus wagons. It entered the truck field fifteen months ago. The company owns its own plant, occupying several acres in the heart of the industrial district of St. Louis.

The frame and radiator are made at the Luedinghaus plant. The rest of the truck is assembled with well known units. These include a Herschell-Spillman four-cylinder engine, Westinghouse generator, Exide battery, Schebler carbureter, Borg & Beck clutch and Grant-Lees gearset, Columbia or Shuler rear axles, Tuthill springs, and Spicer universal joints.

The engine is cast in block. Lubrication is taken care of by a splash-pressure system. The water is circulated by thermo-syphon.

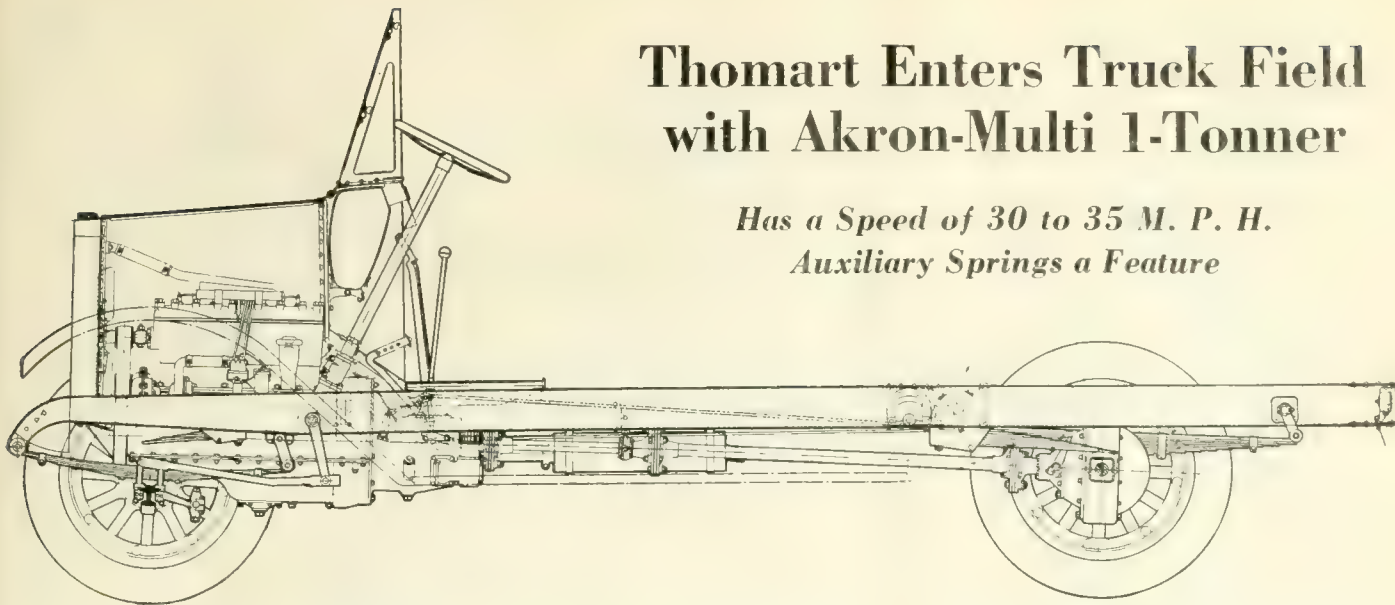


*The new 1-ton Luedinghaus worm-driven model which has been designed for heavy duty service and is featured by its economy of operation and sturdiness*



## Thomart Enters Truck Field with Akron-Multi 1-Tonner

*Has a Speed of 30 to 35 M. P. H.  
Auxiliary Springs a Feature*



**T**HE Thomart Motor Co., Kent, Ohio, is a newcomer in the truck field. It has started production on a 1-ton bevel-driven speed truck, equipped with pneumatic tires. The truck has a speed of 30 to 35 m.p.h. A 1-year guarantee against defective construction, is given.

Standard equipment includes a Westinghouse starting, lighting and ignition system. One of the features in connection with the design of this new truck is the use of a primary set of semi-elliptic springs with a set of quarter-elliptic auxiliary springs secured to the under side of the frame channels, both

### AKRON-MULTI SPECIFICATIONS

Capacity, tons.....	1
Price.....	\$2,685
Wheelbase, in.....	133
Tires, front.....	34 x 5
Tires, rear.....	34 x 5
Bore, in.....	4
Stroke, in.....	5.4
N. A. C. C. hp.....	25.6
Speed, r.p.m.....	—
Speed, m.p.h.....	30
Gear ratio in high gear.....	5.12 1/2
Final drive.....	Bevel

front and rear. The free ends of these auxiliary springs come down on the spring pressure plates when the truck is heavily loaded.

The truck is assembled with a Hinkley four-cylinder block engine, Hydraulic pressed steel frame of the flexible type, Fedders pressed steel radiator with a cellular core, Stromberg carbureter, Warner drive disk clutch, a three-speed gearset, a unit with the engine; Eaton rear axle and Saginaw steering gear.

The driveshaft is made up in two sections with three fabric universal joints, the central joint being supported by a floating ball bearing. The rear axle is a semi-floating, spiral-bevel-gear driven type and Hotchkiss type of drive is used.

## New 1-Ton Stoughton Designed for Speedy Delivery

### STOUGHTON SPECIFICATIONS

Capacity, tons.....	1
Price.....	\$1,995
Wheelbase, in.....	130
Tires, front.....	34 x 4 1/2
Tires, rear.....	35 x 5
Bore, in.....	3 3/4
Stroke, in.....	5 1/4
N. A. C. C. hp.....	22.5
Speed, r.p.m.....	—
Speed, m.p.h.....	—
Gear ratio in high gear.....	5.0 to 1
Final drive.....	Worm

**T**HE new 1-ton worm-driven model added by the Stoughton Wagon Co., Stoughton, Wis., now completes a line that also includes 1 1/2- and 2-ton sizes. Although designed for a general utility vehicle, the new model was built particularly for use in all kinds of speed delivery service and for the farm market. In many respects the 1-tonner is quite similar to the 1 1/2-ton size. It differs only in the use of pneumatics instead of solids, a shorter wheelbase, smaller tires, a starting and lighting system instead of lighting only, and a higher gear ratio.

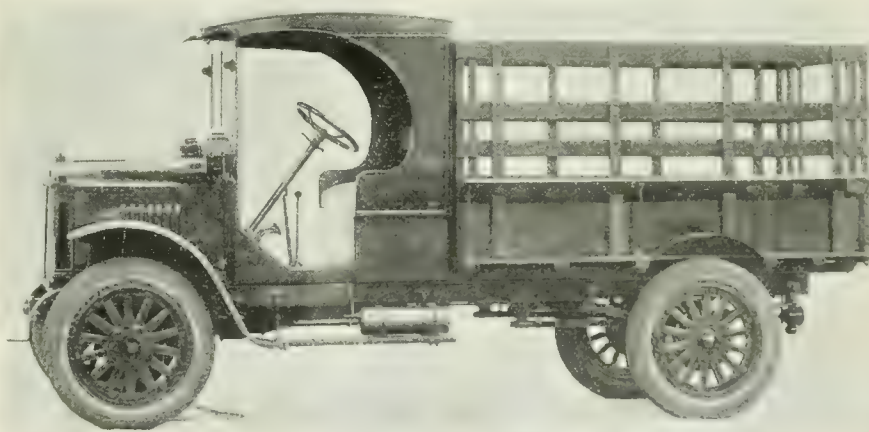
It is assembled with the following units: Waukesha four-cylinder block engine with a removable head, Stromberg carbureter, Eisemann high-tension magneto with impulse starter, Brown-Lipe clutch and gearset, Sheldon front and rear axles, Sheldon springs, Detroit Pressed Steel frame, Lavine steering gear, and Thermoid-Hardy universal

joints. The weight of the chassis is 3300 lb. The chassis overall length is 15 ft. and from the seat to the rear axle the length is 60 in. From the seat to the rear end of the frame the length is 90 in.

Fuel is fed by gravity from a 23-gal. tank located under the seat. The fin and tube type of radiator is of Stoughton design. The finned tube core is of Chicago design. The tanks are removable. Water is circulated by a centrifugal

pump. The clutch is of the dry-disk type and the three-speed gearset is a unit with the engine. Propulsion is taken through the radius rods and torque through the springs. Drive from the gearset to the rear axle is taken through a two-piece driveshaft, supported amidships in a SKF self-aligning ball bearing. Three universal joints are used.

The frame is of pressed steel material and rigid construction. It has a 5-in. channel and a flange width of 3 in.



*The new 1-ton Stoughton is equipped with pneumatic tires and a starting and lighting system*

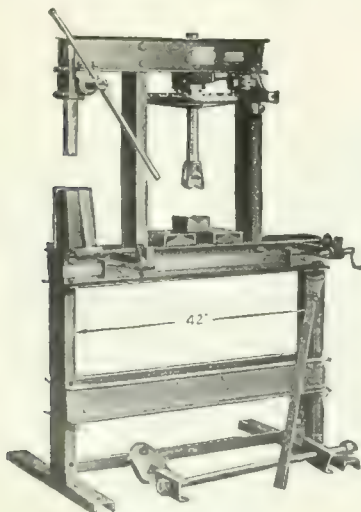
# Shop Equipment

**Time and Money Saved  
in Truck Repairs**

## Stanley Drill

**T**HE Stanley sensitive drill has been especially designed for use in truck repairshops. A choice of either motor drive or belt drive is given the purchaser. In order to eliminate vibration, the base has been enlarged to a 25-in. diameter. The spindles are made from spindle steel and are ground to size. The thrust of the spindle is taken on a ball bearing, allowing it to run with the least possible friction. The spindle driving pulley is mounted on a sleeve through which the spindle runs and there is no pressure on the spindle from the driving belt. This arrangement produces a very sensitive spindle. The slides and fits are all scraped to proper alignment. The changes of speed are accomplished by cone pulleys within easy range of the operator. The countershaft is self-contained and may be detached from the base in case that conditions require installation of the countershaft overhead. The latter is provided with oil holes to accommodate either the floor or overhead position.

The motor is of  $\frac{1}{2}$  hp. capacity, wired with switch, ready to connect. The specifications include the following: Capacity,  $\frac{1}{2}$ -in. drill-ball bearing thrust on spindle; from center of spindle to column at square table,  $7\frac{1}{2}$  in.; from center of spindle to column at round table,  $6\frac{1}{2}$  in.; vertical adjustment to head, 10 in.; vertical travel to spindle, 3 in.; hole in spindle, No. 1 Morse taper; size of cone pulleys, 3, 4 and 5 in.; speed of countershaft, 900 r.p.m.; weight 300 lb.; spindle speeds, 600 to 2,400. The price is \$136. The maker is the Francis Reed Co., Worcester, Mass.

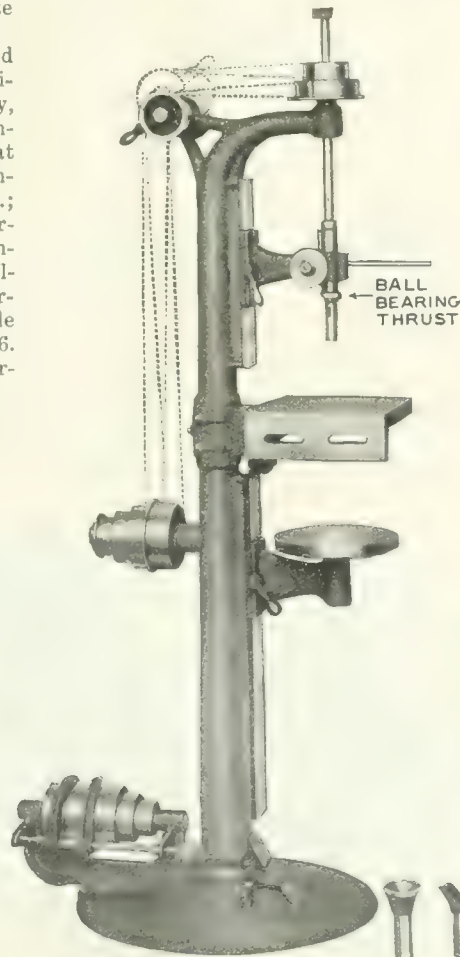


*The Manley 22-ton press  
with a high-speed rack and  
piston press attachment*

**Stanley Drill**  
**Manley 22-Ton Press**  
**Victory Ring Compressor**  
**Athol Swivel Base Vise**  
**Dixie Valve Tools**  
**Canedy-Otto Vise**  
**Service Piston Aligning  
Fixture**

## Manley 22-Ton Press

**M**UCH of the press work in motor truck repairing is on light jobs, such as small bushings and pins and small parts. Only a few tons pressure is required. The Manley Mfg. Co., York, Pa., has recognized this condition and



*The Stanley sensitive drill gives  
a choice of motor or belt drive*

has designed a high speed rack and pinion press, as an attachment to all Manley presses, for handling this light work.

One stroke on the rack and pinion press moves the ram  $1\frac{1}{4}$ -in., while one stroke of 2200-5000 to 1 ratchet leverage of the screw press moves the screw only  $1/80$ -in.

The rack and pinion press has a leverage of 44 to 1, one man exerts a pressure of 5 tons, which is sufficient for all light work. The lever is 30 in. long. The ram is of  $1\frac{1}{8}$ -in. square steel, has an 8 pitch and travels 12 in. The clearance between the ram and upright is 10 in., so the press takes work 20 in. in diameter.

In the 42-in. press, shown in the accompanying illustration, the maximum distance between the ram and the upper table is 22 in., and a special V-block table is furnished, giving zero clearance.

Test centers are also made as an attachment to all Manley presses. They are necessary in straightening work. They are universal in that they will take work either with or without center holes. For work having center holes the Manley attachment is equipped with two 60 deg. centers. For work without center holes the attachment is equipped with two V blocks. The 60 deg. centers are adjustable to suit work of any length up to 42-in. between the centers and work of any length may be tested in the V blocks.

The test centers complete cost \$12. The price of the combination screw press with rack and pinion press attached is \$130.

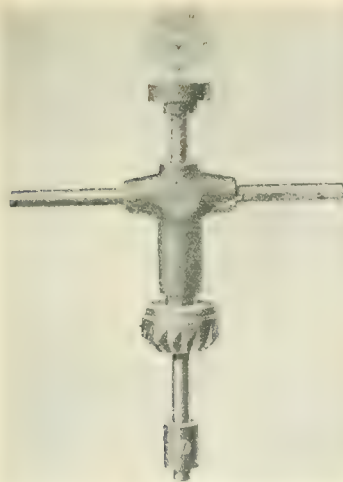
## Victory Ring Compressor

**T**HE Victory Piston Ring Compressor, it is stated, inserts pistons in either the top or bottom of the cylinder in 10 sec. without danger of ring breakage. The device is adjustable to all size rings from  $2\frac{1}{4}$  to 9 in. In operation, all that has to be done is to insert the piston into the

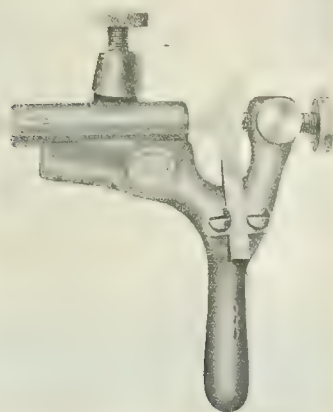


*The Victory ring compressor*

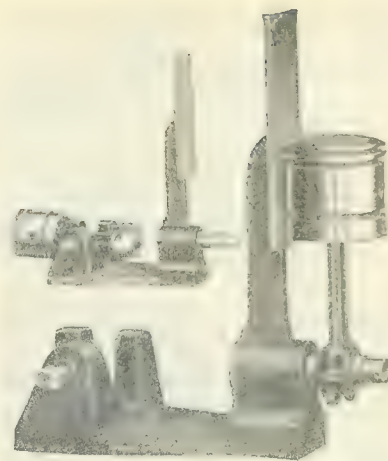




*Micrometer adjustment on the Dixie valve seat reamer*



*A crooked stem is immediately detected with Dixie facing tool*



*The piston aligning fixture made by the Service Products Co.*

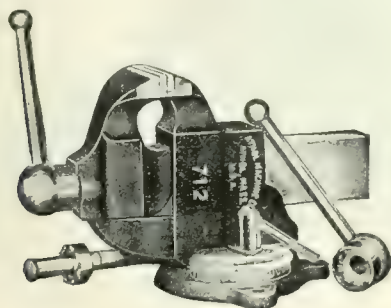
cylinder, place the steel band of the compressor over the piston rings, compress and push the piston into the cylinder. The price is \$2 and the maker is the Victory Ring Compressor Co., Grand Rapids, Mich.

### Piston Aligning Fixture

THE piston aligning fixture made by the Service Products Co., Springfield, Ohio, consists of a heavy casting which can be bolted to a bench. On this casting is an upright face accurately machined and polished. Extending at right angles to this face is a 1-in. steel arbor which is placed in the base so that it is perfectly square with the face. At the rear is a set of jaws and set screw by means of which the connecting rod can be straightened before it is placed in the fixture for testing the alignment of the rod. Regular equipment includes a 1¼-in. bushing which will fit the model T Ford, and by using extra bushings other connecting rods to fit various makes of engines can be tested.

### Athol Swivel Base Vise

THE No. 712 Athol vise has all of the features of the stationary base vise and has in addition the improved locking device which consists of a bolt, with a corrugated head, engaging a correspondingly corrugated base fastened to the bench. Loosening the nut on the bolt releases the corrugated connection, when the vise can be swiveled to any desired angle and quickly locked by turning the nut connected with the lever handle. Holding



the lever upright the nut can be speedily rotated by the thumb and finger, then dropped and used to give the locking grip which will hold firmly.

The ratchet handle can be swung to any point independent of the movement of the jaws, and the mechanic can place the handle in such a position as is most convenient and natural for him to work with. The handle cannot slip through the head.

The vise screw is made up with a buttress type of thread which gives the greatest possible leverage in the jaws with the least expenditure of effort.

The width of the jaws is 4 in. When opened the jaws have a width of 5 in. The price is \$10.50. The maker is the Athol Machine Co., Athol, Mass.

### Dixie Valve Tools

MICROMETER adjustment on the feed screws insures cutting of the valve faces and seats with accuracy with the Dixie valve facing and seating tools. One of the most important uses of the facing tool is for determining the accuracy of a new valve before installing, as they are very seldom true. A crooked stem is immediately detected, eliminating the possibility of placing them in the engine. This tool is simple in design and practical in operation. It is fitted with a patented sleeve through which the valve stem is passed when placed in the tool for facing. This sleeve acts as a guide for the cutting edge and the tool revolves on the valve stem as an axis. The sleeve supports the valve stem at the correct angle with the cutting edge.

The purpose of the valve-seating tool is to ream the valve seat in the engine block to a perfectly accurate angle with the valve face. To use this tool the valve stems are removed from

the guides in the engine block and the stem of the tool is inserted. It is held stationary in that position by means of the sleeve lock at the bottom and a micrometer feed screw at the top of the tool. The stem of the tool then occupies the normal position of the valve stem and the reamer rests on the valve seat in the normal position of the valve face.

By adjusting the micrometer feed screw to the depth of cut desired, the reamer is forced down against the valve seat at exactly the correct angle. By turning the tool with the hand, the valve seat is cut accurately and quickly. A 45-deg. reamer is standard and is regularly furnished with the tool. Reamers at any other angle can be furnished at extra cost.

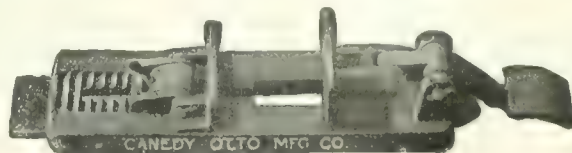
The price of each of these tools is \$5. The maker is the Southern Machine & Tool Co., St. Louis, Mo.; the sole distributor being the Tuthill Sales Co., St. Louis and Kansas City, Mo.

### Canedy-Otto Battery Vise

IN the repair of storage batteries there is considerable use for tools that can increase the efficiency in this work. The Canedy-Otto Battery Vise has been designed to speed up the work connected with replacing cells, its construction preventing breakage and the possibility of acid striking the shoes or clothes of the operator. The mechanical construction consists of a sliding jaw carrying two pawls which engage ratchet teeth on the base. Another jaw is given clamping power, being connected by a toggle link to the pedal and holds tight under low pressure. The vise will accommodate any make and size of battery. The parts are interchangeable and easily renewed. The price is \$12; the maker being the Canedy-Otto Mfg. Co., Chicago Heights, Ill.

*Left—An improved locking device is one feature of Athol vise*

*Right—The Canedy-Otto battery vise facilitates replacing of cells*





# New Accessories and Parts

*Bell Safety Bumper—Michon Ford Brake Adjuster—Ford Dump Mechanism—Whip-Not Stabilizer—Wheel Misalignment Indicator—All-Weld Radiator Guard—Thomas Twin Seat Plug*

## Bell Safety Bumper

**T**HE demand for a truck bumper that will not only save the truck from damage but will also reduce the danger to pedestrians from collision, has been met by the new Bell Safety Bumper, manufactured by the Bell Safety Bumper Co., 1332 56th Street, Brooklyn, N. Y.

Spanning the entire width of the chassis, and overlapping it 4 in. on both ends, is a rugged 4-in. wide channel; attached to this channel, by wrought steel hinges, are 15-inch flatiron arms. Supporting these arms are two 8-in. hardened coil springs. Tightly stretched over these arms, running from end to end, is an unbreakable many-ply weather resisting fabric belt—the whole making a device that will withstand any kind of shock and that will cushion the impact on collision and eliminate danger to the truck and its mechanism.

The radiator guard, built in combination with the bumper, is made of spring steel and its rugged construction is a guarantee of safety for the radiator from all damage by collision with other vehicles.

The makers claim that the bumper will withstand any impact and that its means of cushioning the blow caused by collision with other vehicles is unique in the bumper field.

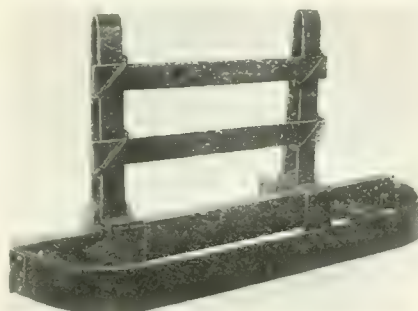
## Michon Ford Brake Adjuster

**W**ITH the Michon brake and reverse band adjusting device, the manufacturer claims that it is no longer neces-

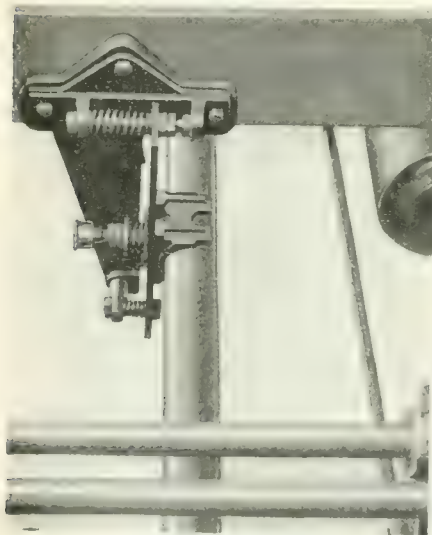
sary for Ford operators to remove the gearset case cover to effect an adjustment of the brake and reverse bands, as the adjusting lock nuts for both bands are carried through on a shaft to the outside of the gearset case. In this way all three bands can be adjusted by the mere application of a wrench to the proper bolts outside the case. The price is \$3 per set. The manufacturer is the Michon Mfg. Co., Toledo, Ohio.



*The Michon Ford brake adjuster*



*The Bell bumper for trucks*



*Whip-Not stabilizer*

## Ford Dump Mechanism

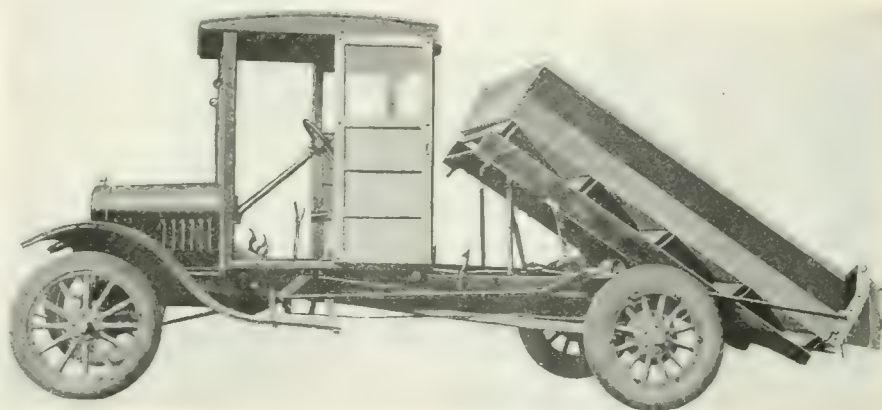
**S**OMETHING new in Ford dump mechanism has been perfected by the Standard Steel Works, Kansas City, Mo. The device is known as the Standard Ford speed dump and is designed for 1-ton trucks. It is especially adapted to farm work, contracting and general use where quick hauls are needed. The dump, which is constructed of wrought iron throughout, can be installed on a Ford chassis in 10 min. No mechanism is connected with the truck power. The mechanism is operated from the driver's seat by a hand lever. An automatic locking device prevents the body from slipping back accidentally.

This dump varies in capacity from 27 cu. ft. to 40½ cu. ft., and its total weight, including a steel body, is from 450 to 550 lb., depending on the model. The device weighs 165 lb. complete.

## Whip-Not Stabilizer

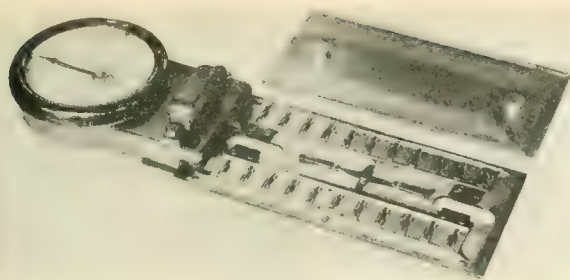
**T**O overcome the strain brought upon the universal joints and bearings by the tendency of motor truck propeller shafts to whip at high speeds and over rough roads, motor truck engineers have turned to the amidships gearsets, or the two-piece shaft, with extra universal joint and support at the center.

The Whip-Not Stabilizer has been designed to overcome the necessity of placing gearsets amidships, the manufacturer claiming that by doing so there is a lessened power applied to the rear axle and an added weight to the truck together with a materially complicated construction. The stabilizer is a floating bearing, attached to the cross member of



*The Ford dump mechanism made by the Standard Steel Works*





*The Weaver wheel misalignment indicator*



*The Weaver wheel indicator in operation*

the truck frame, which allows the propeller shaft to move freely in any direction except in a whipping circle. By its yielding resistance it eliminates the tendency to whip.

By eliminating the tendency to whip, this stabilizer, it is stated, permits the use of a one-piece driveshaft of small diameter. The accompanying illustration shows the stabilizer installation as adopted by the Huffman Bros. Motor Co., Elkhart, Ind. The Bethlehem Motors Corp. also includes this device as standard equipment on its trucks. The Republic Motor Truck Co., Alma, Mich., is using the device through its service department to supply dealers on certain types of Republic trucks equipped with long driveshafts.

The price of the complete assembly is \$20. The maker is the Carter Carburetor Co., St. Louis, Mo.

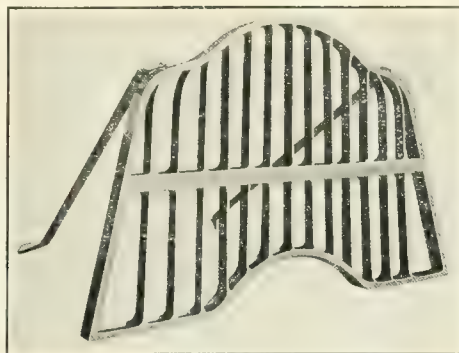
### Wheel Misalignment Indicator

**T**RUCK wheel alignment is one of the biggest factors influencing the cost of upkeep. One of the great items of expense is tires. Misalignment of wheels is the greatest single factor responsible for unnecessary tire wear. It is perfectly evident that when the wheels are parallel, the wear on the tires is at minimum since the wheels simply roll along the road or pavement with no friction. Any deviation from this parallelism, however, develops a side thrust or drag on the tires that is very destructive especially when driving over pavement or hard surface roads.

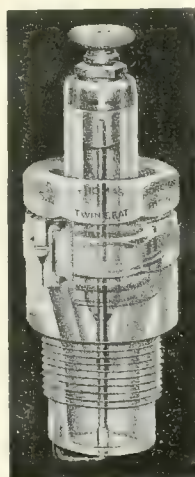
The Weaver Mfg. Co., Springfield, Ill., has recently placed an indicator on the market that is claimed to accurately record the misalignment of the wheels to the minutest fraction of an inch by simply driving one wheel of the truck over it. The circumstances which led to the conception of the principle involved in this instrument are of general interest.

The idea was first conceived as a result of the very noticeable difference in the impression left in sandy or oil-coated roads by the wheels of different trucks which passed over them. It was found that a truck having the wheels in perfect alignment left a clean, evenly balanced impression in the sand or oil, while the truck having its wheels more or less out of proper alignment continually pushed the soft surface of the road which was misplaced by the weight of the tire to the side toward which the wheels inclined.

An experiment consisting of placing a



*The All-Weld radiator guard*



*Thomas twin seat spark plug*

piece of cardboard on a heavily greased spot on a cement road with a mark on the cardboard to indicate the amount of travel as the misaligned wheel passed over it, was conducted. It was found that the cardboard was drawn sideways a distance corresponding to the misalignment of the wheels.

The instrument shown in the accompanying illustration consists of two flat steel plates with roller bearings between, the upper plate being connected with a recording mechanism which registers the movement of the plate on the dial. The upper plate moves over the lower on the two sets of rollers as the wheel passes over it. The movement of the plate actuates a lever connected with the master hand on the dial which operates two similar hands, one of which moving to the left registers how much the wheels are toed in, the other moving to the right indicating how much the wheels are toed

out. The hands remain stationary in the position deposited by the master hand until the reading is taken, when they are returned to zero by pressing a lever at the side of the dial. The top plate and rollers are automatically brought back to their original position, as soon as the wheel passes off the plate. The two metal strips carrying the rollers can be removed for cleaning. On the dial is a separate scale for each size tire from 30 to 42 in., insuring the correct measurement of tires of all sizes.

The Weaver company has built two types of alignment indicators, a portable type which is designed for use in the shop in aligning the wheels after the stationary instrument (other type built) has shown that the wheels need attention.

### All-Weld Radiator Guard

**T**HE All-Weld steel one-piece truck radiator guard is made practically of one piece, due to the welding of all joints. The guard is made up of three units, the guard proper, which conforms to the size and shape of the radiator, and two side braces, bolted to the guard and side members of the frame.

The frame is either 2-in. steel channel or angle, at the option of the buyer. The frame incloses a series of vertical flat steel bars,  $\frac{1}{4}$  in. to  $\frac{3}{8}$  in. thick and  $1\frac{1}{4}$  in. wide. These vertical bars are spaced close enough to insure protection to the radiator and still leave ample opening for proper circulation of the air.

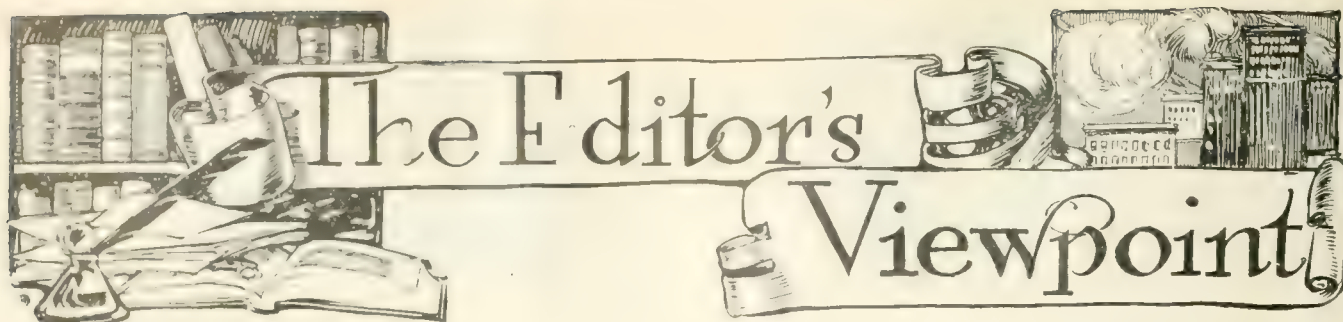
A flat steel bar is welded horizontally across the guard, midway between the top and bottom. This construction results in a guard which not only resists a straight blow, but also an oblique one.

The guards are attached in the conventional manner by either angle, round or flat steel side braces. The makers are Michaels & Mourre, New York City.

### Thomas Twin Seat Plug

**T**HE Thomas spark plug has a removable center electrode. It consists of three parts, the center electrode which also carries the insulator, the shell body and the binding nut and gasket. When it is necessary to clean the plug, only the center electrode need be removed. Metallic sealing gaskets are used. The plugs may also be used instead of priming cups. If an insulator is broken, it is only necessary to replace the center electrode assembly. The price is \$1.50. The maker is the Thomas Spark Plug Co., Roselle Park, N. J.





## Speeding Up Parts Delivery

**M**ANY of the complaints made against truck makers for the slow delivery of repair parts ordered from the factory are often due in part to the fault of the truck owner himself. He often orders from the factory service department, parts which he does not describe properly and fails to give the model number of the truck and its serial number.

Of course, when this is the case, delay results, and if the truck is held idle awaiting the receipt of the part, the enforced idleness means a reduction in the earning power of the truck.

Whenever ordering parts from a factory, the owner should try to picture what is done with his telegram or letter when it reaches the truck maker. Each part of the truck is numbered or lettered and these identifying parts are generally contained in instruction books or parts lists issued by the maker. When these identifying marks are given in the owner's communication, together with the truck model and serial number, it is a simple matter to determine just what part is desired. Without such a record, it becomes necessary for the maker to write or wire the owner for further particulars and this not only causes delays, but costs money.

Every owner should keep instruction books and parts lists always on hand so that in case new parts are needed in an emergency, full particulars may be sent to the factory or the nearest branch with a reasonable assurance that the proper part, once identified, will be sent immediately if it is in stock.

Several truck makers are giving this matter their attention in an attempt to get the truck owner to do his share toward making better service possible. One manufacturer has even gone so far as to suggest the addition of a plate on the toeboard just forward of the steering column requesting that the purchaser of the truck at once communicate with the factory of the maker, giving the model and serial numbers and the date of purchase. It may even be possible at a later date to incorporate the proposed plate with the standard caution plate now fitted on most truck chassis.

Such a move would have advantages for both the truck maker and user. In the first place, it would enable the maker to keep a more accurate record of where his trucks are actually in service and by whom owned, regardless of the number of times the truck may change hands. If the maker at all times knows the name and address of every owner of his trucks, he can send them instruction books and parts lists so that it will be as easy as possible to order parts without error and the consequent costly delays.

If the urgings of such a plate to communicate at once with the factory were carried out, it would be of particular advantage to the buyer of a second-hand truck, since the original owner does not generally turn over a parts list to the new purchaser or advise the factory of the sale, so that there is no way of getting into communication with the new owner of the truck.

## Factory Service for Owners

**T**HE thought of a truck owner in New York or Chicago sending his truck to the home factory in Detroit or elsewhere for rebuilding is a new and radical one but yet an idea which has many advantages in its favor. The thought has been already put into execution by the plan of one truck manufacturer who does not claim credit for the idea but points out that it is already being done in Europe as a result of the trucks left over from the war.

The sponsor of the plan points out that theoretically there is no one better qualified to rebuild a truck than the concern which made it in the first place. In this connection it should be borne in mind that con-

cerns which simply assemble truck units made by others will have to install additional equipment such as cylinder reboring machines, crankshaft grinders and the like and develop men to operate these machines efficiently.

It is further pointed out that the time to ship the truck to and from its home city and the time of doing the work at the factory probably would not exceed that taken by the average service station in the home town and the factory-done work would more likely be of a higher grade, since it would be given the same guarantee as that on a new truck leaving the factory for the first time.



See whether you have your spark advance correct; whether the cylinders are carbonized; whether the fan belt is too loose; whether the water level in the radiator is low; whether you are using anti-freeze mixture in radiator in warm weather; whether radiator or water jackets are clogged; and whether you have insufficient lubrication or, especially, the oil needs changing.



## Wants Up-to-Date Set of Books on Motor Vehicle Repair

To the Editor, COMMERCIAL VEHICLE:

I would like to know whether there is a good set of books on motor vehicle construction, repair and maintenance, one that is up-to-date.—G. J. NEWTON, Waterbury, Conn.

The U. P. C. Book Co. has advised us that one of the best sets of books on the motor vehicle from the construction standpoint is the three-volume edition of Heldt's "Gasoline Automobile." This was published in revised and enlarged form just a few months ago. The volumes are sold separately and each is complete in itself. The titles and prices are as follows:

Vol. I—The Gasoline Motor, 672 pgs., 400 figs., 32 plates, \$6.00  
Vol. II—Transmission, Running Gear and Control, 636 pgs., 408 illust., 31 plates, \$6.00  
Vol. III—Electrical Equipment, 410 pgs., 319 illust. \$4.00

"Dyke's Automobile Encyclopedia" is another book that you will find useful if you are not in possession of a copy. While it does not take up the subject in the same way as Mr. Heldt does, it contains a great amount of valuable material collected from all sources and applying to all phases of the subject, such as construction, repair, maintenance, etc. that there is hardly a shop in the country that hasn't a copy. It contains 940 pages, 3501 figures and sells for \$6.50 delivered.

Page's "Automobile Repairing Made Easy" (price \$4.00), Hall's "Automobile Construction and Repair" (price \$3.50) and Page's "Modern Gasoline Automobile: Its Design, Construction, Maintenance and Operation" (price \$4.00) will also be interesting.

Circulars and further information regarding these books may be obtained from the U. P. C. Book Co., 243 West 39th St., New York City.

## Tie Rod Adjustment Necessary for Prolonging Tire Life

To the Editor, COMMERCIAL VEHICLE:

Will you please explain how to adjust the tie rod on my Available truck so that I may get the proper toe-in of the front wheels. I appreciate the fact that much of the tire wear has been due to the need of this adjustment but do not know exactly just how much to allow for this adjustment.—A. C., Bronx, N. Y.

It is important for the life of the tires and the easy steering of the truck that the front wheels toe-in slightly; that is, they should be from  $\frac{3}{8}$  to  $\frac{1}{2}$  in. closer together at their front edges than in the rear.

This adjustment is provided for by a threaded connection at one end of the cross tie-rod which connects the two steering knuckles and which runs behind the front axle bed.

The operation may be easily performed by taking a piece of chalk and, with the wheels jacked clear of the ground, spinning them while holding the chalk against the face of the tire. This will draw a line completely around the out-

side of the tire. Then measure the distance apart of the lines at the front of the wheel and again at a point in the rear and as nearly opposite the point in front as can be reached.

The front measurement should be from  $\frac{3}{8}$  to  $\frac{1}{2}$  in. less than the rear. If this is not found to be true, loosen the fastening at the adjustable end of the tie rod, take out the small yoke pin at this end and turn the free end of the rod one way or the other. Then replace the pin and take another measurement. Continue thus until the proper distance is secured. Lock the adjustment securely and replace the nut and cotter pin of the yoke bolt.

## Knocks in the Engine and How to Determine Their Location

To the Editor, COMMERCIAL VEHICLE:

I would like to have all the information on how to detect the location of the various knocks in the engines used in my trucks. I would also appreciate any other information on bearing wear.—G. BULGER, Worcester, Mass.

The life of the engine depends largely on its bearings. Driving with loose bearings will eventually cause them to hammer out and break, this generally resulting in sending a connecting rod through the side of the crankcase and in wrecking the engine. Bearings should be examined for looseness whenever the oil pan is removed because they may be much too loose, and still not loose enough to knock badly.

The connecting rod lower end bearings and the wristpin bearings will usually wear quicker than will the main, or crankshaft bearings.

A loose connecting rod lower end bearing produces a light, sharp thump. It will be present when running down hill with the clutch engaged.

A loose wristpin bearing causes a light, sharp tapping which is very noticeable when the engine is running light.

A loose crankshaft main bearing causes a dull thud under heavy load.

Looseness of the connecting rod lower end and wristpin bearings may be determined by shaking or prying on the parts. Looseness in the crankshaft bearings may be found by placing a jack under the flywheel and watching for oil to squeeze out of the bearings as the jack is raised and lowered by its handle.

Adjust the connecting rod lower end bearings by the removal of shims or by draw-filing the caps so that there is no appreciable up and down motion. This calls for a radial clearance of about .002 of an inch.

The bearings must not be fitted too tight, as this will cause heating and trouble in spite of the oil. It is also highly important that the connecting rod bearings should have some side play along the crankpin. This means that the ends of the bearing liners should not bear snugly on the fillets at the ends of the crankpins.

If, after adjusting a bearing, it seems too tight it is advisable to hit it a few times with a hammer from below which will generally produce a satisfactory working fit.

## Comparing Truck and Airplane Overland Haulage Costs

To the Editor, COMMERCIAL VEHICLE:

In an attempt to compare the cost of delivering rush goods by airplane and by motor truck, I would appreciate it if you would give me any costs of operation on motor trucks of different sizes over routes of 300 miles and up. My calculations for a 1-ton truck for a 300-mile distance figure about 25 cents per ton-mile, and by airplane about 30 cents per ton-mile.—W. B. S., Detroit.

Truck costs for routes 300 miles long are very scarce, because there are no such routes in service at this time from which we can draw authentic figures. We believe that the experimental Goodyear truck routes between Akron and Boston, the figures for which were never given out, may be obtained from the Goodyear company.

It would seem a poor policy to run a 1-ton truck over a 300-mile route, because a 5-ton truck, while not having the same element of speed, could carry goods cheaper per ton. This is due to the fact that it is more economical, per unit, to move in large loads than small loads.

Without knowing any of the conditions under which trucks would have to run on a 300-mile route, we might give you some approximate costs on a 1-ton truck as follows:

	Cost per Mile
Gasoline .....	\$0.035
Oil .....	0.001
Repairs .....	0.02
Tires (pneumatic) .....	0.08
Depreciation, life of 150,000 miles .....	0.02
	\$0.156

For a 300-mile trip this would give mileage costs on the above items of \$46.80.

Presuming that a 1-ton truck could cover 300 miles in a working day of 15 hours, with the driver paid at the rate of \$10 for 15 hours, you would have to add the following items to the above costs:

Interest on investment .....	\$0.45
Insurance .....	0.50
Licenses .....	0.10
Garage .....	1.00
Driver .....	10.00
	\$12.05

Adding this total of \$12.05 to the \$46.80 previously obtained would give \$58.85 as the approximate running costs. To carry on such work on a commercial basis, it has been found that the basis upon which rates must be determined should be approximately double the actual operating costs. This would make the total cost approximately \$118.

Before attempting to determine the cost per ton-mile from this figure it should be borne in mind that there are two methods of figuring the term ton-mile.

One is what we call the absolute ton-mile, meaning the carrying of 1 ton for a distance of 1 mile. In our work in THE COMMERCIAL VEHICLE, we do not use this absolute ton-mile because it cannot be calculated readily when loads are dropped off or picked up at intermediate points along the route.



Instead, we use the term commercial ton-mile, in which the commercial ton mileage is determined by multiplying the total tonnage carried by one-half the trip distance. In the case just cited, the trip distance would be 600 miles, or a round trip on a 300-mile run.

Provided none of the load carried on the 1-ton truck was discharged on the trip and using the absolute ton-mile as a basis, the cost per absolute ton-mile would be \$118 divided by  $1 \times 300$  or approximately 40 cents per absolute ton-mile.

If the commercial ton-mile unit were taken as a basis and another 1-ton load carried on the return trip, the total number of ton-miles would be

$$600 \times 2 =$$

or 600 commercial ton miles. The cost of the round trip would be double that of the one-way trip, or \$236. This sum divided by 600 commercial ton-miles would also give 40 cents a ton-mile on the commercial basis.

With a 5-ton truck running on routes 100 miles long one way, such as that between New York and Philadelphia, the rate has been set by experience at \$1 per mile. This rate would include the actual cost of operation, plus the cost of doing business at a 10 per cent profit. At this rate, the cost of a 600-mile trip would be approximately \$600 for a 5-ton truck, although the slower speed of the truck would probably make the trip take 3 days of 10 hours each, unless sleeping quarters were provided in the truck cab as was the case with the Goodyear trucks. Otherwise, the round trip would cost approximately \$700 for a total of 3000 commercial ton-miles.

Although the figures quoted above are not actual figures, we trust they will be of some value to you at least as an indication of the cost of truck operation under fairly favorable conditions and to bring home the fact that it is not economical to ship by truck on distance up to 300 miles under the present day development of both trucks and highways.

## How to Detect Alkali or Acid in Lubricating Oils

To the Editor, COMMERCIAL VEHICLE:

I would appreciate any information you may have on how to detect acid or alkali in any lubricant.—C. W., New York City.

Acid or alkali may be detected in any lubricant by immersing a strip of litmus paper which may be secured from a drug store. Blue paper will turn red if acid is present, while red paper will turn blue if there is free alkali.

Another ready test is the emulsion test. A sample bottle is filled one-third full with the oil to be tested and an equal amount of water added. After the bottle has been corked and shaken vigorously for 20 or 30 min., it is set aside for 24 hr. Good oil shows a fine or distinct line of demarkation between the water and the oil above it. This indicates the absence of acid compounds. A slightly poorer grade of oil shows a less distinct line of demarkation, and a poor oil a curdled mass floating upon a milky colored water at the bottom.

## Information on How to Make Flux for Soldering

To the Editor, COMMERCIAL VEHICLE:

In the Oct. 1 issue of THE COMMERCIAL VEHICLE you gave a formula for soldering brass. Will you kindly give me the correct proportions for making the flux as I have a great deal of soldering of brass and copper and brass to iron.—T. L. BOBLITS, Baltimore, Md.

Borax and salammoniac are used chiefly as a means to tin the soldering iron. Borax is preferable when the soldering is quite difficult, such as the soldering of a large copper container which will tend to rob the soldering iron of much of its heat. When either of these materials is used the iron is first heated to its proper temperature and is then rubbed vigorously on a crystal of salammoniac or on the borax held in a convenient container. The action of either of these on the iron is to remove all foreign substances and thus permit of a thorough coating of lead over the iron's surface.

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE.

It is an open forum for the discussion of motor truck problems by our readers.

Make use of it.

The editors will be glad to answer any questions which you ask.

## Answers

### Engine Loads Up on Long Pull and Then Gallops

To the Editor, COMMERCIAL VEHICLE:

When my truck is put on a long, hard pull it will load up and gallop when it lets up a little. The carbureter is set as lean as possible. The engine is in good shape.—H. WARD, Cleveland, Ohio.

Your trouble seems to be due to fuel feed system. It is possible that in your case raw gasoline is being sucked into the engine through the vacuum pipe leading from the intake manifold to the top of the vacuum tank. Occasionally the small valve in the vacuum tank does not function properly and when this happens you get exactly the actions you describe. Remove the top of the vacuum tank and examine the valve. Sometimes, too, the springs in the top of the tank lose their stiffness from the action of the gasoline and in this case new ones must be installed.

You can test out the vacuum feed by removing the top of the tank and taking out the float mechanism, etc., removing the suction pipe, plugging the hole in the intake manifold and then running the engine with the tank feeding the carbureter by gravity. If when running this way the engine does not load it is an indication that the carburetion and

other items of the engine are functioning properly and that your trouble is with the vacuum feed. As a rule the vacuum tanks are very reliable but occasionally one misfunctions.

## Wrong Timing in an Engine Will Produce a Knock

To the Editor, COMMERCIAL VEHICLE:

What is it that knocks in an engine when it is timed wrong? It is termed a carbon knock. When there is no carbon in the engine where does the metallic sound come from?—G. S., Denver, Colo.

The ignition knock generally referred to is usually a result of too much spark advance. In cases where the timer slips and the engine fires extremely late there is a noticeable loss of power but a knock seldom occurs. Assuming ideal conditions the spark should occur as the piston reaches the top of the compression stroke because it is here that the gas is at the point of greatest compression, therefore more force exerted when the explosion occurs. Because of the fact that ignition does not produce an immediate effect and because it takes time for complete ignition to take place an allowance is made for advancing and retarding the spark. When the spark is advanced it means that ignition takes place before the piston reaches top dead center on the compression stroke.

If the spark is advanced too far so that ignition takes place too long before the piston reaches the top of the compression stroke, especially if running slow, the power would be exerted against the upcoming piston and not only a falling off of power, but also a knock would occur. At the present time, due to ineffective means of handling present day fuel, knocks are occurring which are caused by the fuel and in many instances knocks of this kind have been referred to as ignition knocks.

## The Battle Against Snow

(Continued from page 13)

at the side through a system of ducts. This device is illustrated at the bottom of page 13.

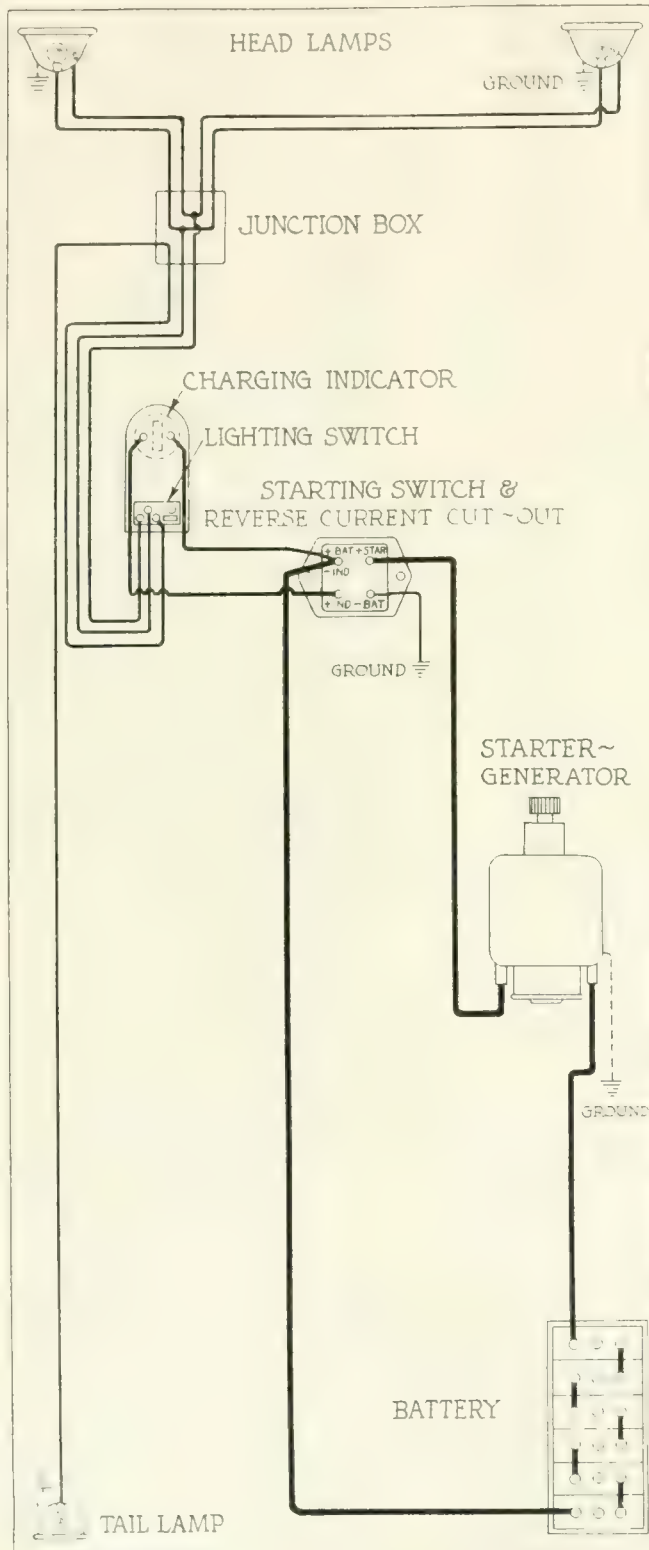
The other type is a machine designed to melt the snow where it lies. An example of this is shown at the top of page 14. It is an oil-burning snow melter of the type used for asphalt attached to the front of a truck.

## Sub-pavement Melter

The fourth type of specialized equipment is that devised to melt the snow after removal. A good example of this type is shown at the top of page 14 on the right. It consists of a chamber designed to be built below the pavement, so that snow can be readily shovelled into it. The snow is caught in a tapered tube and held there until melted. The melting is done by means of fuel burners and hot water and the water is filtered before being passed on into the sewer. This device will prevent the expense of cleaning out the sewers after all sorts of rubbish have been dumped into them along with the snow.

# Motor Truck Electric System Wiring Diagrams

## 13—Starting and Lighting Unit on International Truck



The starting and lighting circuits of the International truck are herewith shown diagrammatically. This general wiring arrangement must never be modified, except for a possible reversal of polarity. Serious damage can be caused the equipment by making connections incorrectly.

Since the starter-generator driving chain is subject to continual wear, it should be kept adequately lubricated. It is also advisable to clean the chain with kerosene or gasoline every few weeks to keep it free from accumulations of dirt and grit. After each cleaning the chain must be thoroughly lubricated again before being replaced in service.

Aside from the usual precautions against water, dirt, loose connections and evaporation of the battery electrolyte, the only point in the electrical system that requires attention during service is the lubrication of the moving parts.

The lubrication of the ball bearings which support of the starter-generator armature is chiefly taken care of by the special grease in which they are packed at the time of manufacture. In addition to this initial lubrication, a few drops of oil should be applied to the bearings every 2 or 3 months.

To lubricate the starter-generator driving chain, a good grade of medium or heavy machine oil should be applied to the inner surface of the chain every few weeks.

### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE:

1	Ford, Starting and Lighting	Oct. 1
2	Acme, Lighting	Oct. 15
3	Bethlehem, Starting and Lighting	Oct. 15
4	Atterbury, Lighting	Nov. 1
5	Ace, Starting and Lighting	Nov. 1
6	Atlas, Starting and Lighting	Nov. 15
7	Briscoe, Starting and Lighting	Nov. 15
8	Defiance, Starting and Lighting	Dec. 1
9	Commerce, Starting and Lighting	Dec. 1
10	Grant, Starting and Lighting	Dec. 15
11	Brockway, Starting	Dec. 15
12	Maxwell, Lighting	Jan. 15
13	International, Starting and Lighting	Feb. 1
14	Mack, Starting and Lighting	Next Issue



## New England Freight Rates Too High

### Railroads Lose Millions of Dollars in Short-Haul Business to Trucks

BOSTON, Jan. 21—New England railroads are losing millions of dollars' worth of short-haul business by reason of exorbitant freight rates and inefficiency in operations, according to a report of a special committee of the New England Traffic League, made public by President W. H. Chandler of the league.

The short-haul business is going to motor truck expresses, which are operated more cheaply and more efficiently than the railroads.

The committee which has been investigating the loss of this tonnage to the railroads met at the Chamber of Commerce yesterday and formulated its report. Returns from questionnaires sent by the committee to New England shippers were compiled and according to Mr. Chandler, the compilations showed that the railroads had already lost nearly all of the short-haul business in the more thickly settled sections of New England.

Motor truck rates from city to city, the committee finds, are cheaper than the rail rates, to say nothing of cartage charges from shipper to railroad station on one end and from railroad to consignee on the other. The trucks pick up freight at the shipper's door and deliver it to the consignee's.

The first-class freight rate on the railroads is \$7.70 per ton for a 10-mile haul. The motor truck express rate is \$5. Delays may keep the rail shipment on the tracks for a week or two, while the truck delivers the shipment the day it receives it, or the following day at the latest.

The committee was told instances where railroad freight shipments were delayed two weeks between points not more than 50 miles apart. One shipment was reported to have been 215 hrs. between Bridgeport, Conn., and New York, a distance of 56 miles.

The committee recommended that the Traffic League lay all of the facts it has collected before the managers of the New England railroads, urging greater efficiency in operating and a revision of rates that the roads recover some of the short-haul business before it is too late.

### GMC Service in Memphis

MEMPHIS, TENN., Jan. 24—The General Motors Truck Co., Pontiac, Mich., has opened a service station that will take care of the repair work of GMC truck owners in Memphis and the surrounding territory. This station is at 1000 Union Avenue.

### Indiana Fights Price Cutting

INDIANAPOLIS, IND., Jan. 25—Members of the Indianapolis Transfer Assn. are now seeking to curb the practice of certain motor truck agents selling motor trucks to individuals whose only method

of getting business is to cut present unstable prices, which from all cost of operation records are now too low to insure a fair profit to the operator.

These sales, it is stated, are nothing more than loans, and they are acting as an injury to the trucking industry in this State. It is also stated that at least twenty dump trucks have been taken back by the truck agents during the past six months because the operators were unable to make payments.

These agents have entered into deals with middlemen who through political or other influences secure large contracts for motor truck haulage and then use the contracts to influence new truck sales, and in addition take a percentage of the profits from the operator for the work secured for him.

### Yale Truck a Newcomer

NEW HAVEN, CONN., Jan. 11—The Yale Motor Truck Co., this city, has entered the truck field with a 1½-ton worm-driven model. It is equipped with electric starting and lighting.

### Two New Apex Truck Models

GRAND HAVEN, MICH., Jan. 20—Two new models have been brought out by the Hamilton Motors Co., a 1-ton speed truck and 3½-ton truck. The 3½-ton model is very similar in design to the 1½- and 2½-ton Apex trucks, the only difference being in the dimensions of parts. It comprises a Buda 4½ by 6 in. engine, a Fuller four-speed amidship gearset, a Torbensen rear axle with external service and internal emergency brake, a Shuler front axle, Blood Bros. universal joints and propeller shaft, G. & O. radiator, Stromberg carburetor, Eisemann magneto, Auto-Lite generator and Lavine steering gear.

The frame is of 7-in. rolled channel steel ¼-in. thick and with 2¾-in. flange, and is suspended on half-elliptic springs. The wheelbase is 160 in., the front tread, 65 in., and the rear tread, 67 in. Wheels are of the wood artillery type, 36 by 5 in. front and 36 by 10 in. rear. The loading space is 168 by 72 in. The standard equipment includes a driver's seat, electric generator, electric head lamp, front fenders, tool box, tools, jack and Alemite grease outfit. The truck will develop a speed of 22 m.p.h., it is claimed.

On the 1-ton speed model a Lycoming 3½ by 5 in. engine is used, together with a Borg & Beck clutch, Muncie transmission, Torbensen axles, Lavine steering gear, G. & O. radiator, Stewart vacuum feed, Stromberg carburetor and Auto-Lite starting and lighting equipment. The frame of this model consists of 4-in. rolled channels, and is supported by half-elliptic springs both front and rear. The wheelbase is 130 in. and the tread the standard 56-in. Firestone cord tires are carried on all four wheels, the dimensions being 33 by 5 in. In connection with this chassis there will be available eight types of body.

The 3½-ton model lists at \$3,975 and the speed model at \$1,695, both for chassis with seat.

## Delivery Convention March 14 to 17

### Wide Range of Topics Will Be Discussed at Pittsburgh by Retail Stores' Executives

NEW YORK CITY, Jan. 27—The International Retail Delivery Association will hold this year's convention at the William Penn Hotel, Pittsburgh, Pa., on March 14, 15, 16 and 17.

The plans formulated for this year's convention will make this the largest that has been held. Executives from all parts of the United States and Canada will explain in detail how they have achieved perfection in their delivery operations and maintenance. At last year's convention there were 107 retail stores represented and from advance information this number will be but a part of those who have expressed their intentions of having representation at this year's convention. In view of the wide range of topics that were discussed at last year's convention, many concerns have already signified their intentions of having other executives, in addition to their delivery executives, present at the coming convention.

While the association is devoted to the improvement of delivery methods, every operation that has any bearing upon delivery work is thoroughly discussed and analyzed from every angle at these gatherings and also throughout the year.

This year's convention will include discussions on the routing of packages; bonus systems; packing and wrapping systems; insurance of vehicles and their loads; record systems; arousing the interest of the employees; non-sheetwriting systems; delivery problems; truck maintenance; electric vehicles, garages and distributing stations, and operating costs.

Every word of these discussions will be recorded. The minutes will be printed and bound and distributed among the members.

There will be a display of appliances and devices that go toward bringing about that desired state of perfection in delivery work. A large part of the hotel has been set aside for this display. Fiber packing containers, tires, batteries, etc., and every other device will be exhibited.

### Opposes Indiana Truck Tax

INDIANAPOLIS, IND., Jan. 26—Additional tax on motor trucks as proposed by the State Legislature now in session is opposed in a public statement issued by William S. Frye, of Indianapolis, president of the Indiana Highways Transport Assn. Legislation directed at heavier taxation on motor trucks would be expensive in the end, Mr. Frye said, because it would retard the development of the highways as a means of transportation. He asserts the suggested taxes are excessive and would not permit the right development of the motor truck as a carrier and as a transportation servant of the State.



## Truck Transportation in Fruit Belts

### California Rapid Transit Co. to Operate Twenty Trucks Out of Los Angeles

NEW YORK CITY, Jan. 17—Results of an experiment in motor transport service which is to be undertaken by the recently formed California Rapid Transit Co. on the Pacific Coast are being awaited with interest by motor truck circles. The company plans to operate a fleet of twenty Mack trucks in the Los Angeles Valley on four routes covering the entire fruit and produce belts in this territory. The trucks will carry fruit, vegetables, milk and merchandise of various sorts.

The routes projected are from Los Angeles to Redlands, from Los Angeles to Mecca, from Los Angeles to Alessandro and from Los Angeles to San Bernardino, with stops at all intervening towns and cities.

### Union Transportation Depot

LOUISVILLE, KY., Jan. 26—H. A. Kampfmüller, head of the Union Transportation Co., has purchased a lot on the south side of Second, north of Market Street, on which he plans to erect a depot building and lounging quarters for farmers. The structure, he said last night, will be of stucco brick with a two-story front. It will cost about \$50,000.

The Union Transportation Co., organized by Mr. Kampfmüller about a year ago, carries freight by truck to and from points within a radius of 50 miles of Louisville. The concern is operating thirty-three trucks and trailers.

### Bus Earns Profit on Railroad

PHILIPSBURG, PA., Jan. 22.—When the Pittsburg & Susquehanna Railway Company installed a Republic motor bus on a spur line of railroad between Philipsburg and Ramey, Pa., it did so with the sole idea of accommodating the people of the two towns, and those living along the line. The fact is, however, that the bus is earning a profit on its operation.

Philipsburg and Ramey are Pennsylvania mining towns, 14 miles apart. They do not supply enough traffic to justify the service of a passenger train. The only means of transportation, until very recently, was by automobile, which was unsatisfactory due to bad roads.

With the intention of supplying regular, dependable transportation, the railroad officials installed a motor truck, especially equipped to run on railroad tracks, and fitted with a bus body. The 2½-ton chassis is fitted with demountable steel railway rims on the rear wheels, and the front axle and wheels replaced with a four-wheel pony truck which follows the curves.

The bus seats 28 passengers in two compartments, the rear one being a smoking room with a circular seat at the back. The fare is 5 cents per mile,

and the average number of passengers carried one way is 30.

The bus makes four round trips per day, running on a regular railroad schedule, with twelve regular stops. There are ten or twelve additional stops at mines, etc. The running time, each way, is 1 hr. There is not a mile of straight track in the entire fourteen, and there are several 1½ per cent grades.

The railroad's report of the first 52 days of operation of the bus, shows 6032 miles traveled, gross revenue of \$2,120.95, total expense of \$1,522.66, and net earnings of \$598.29, or 9.9 cents per mile. The results of the bus operation have so impressed the railroad officials that a trailer, with railroad rims and special box car body, has been installed for baggage and express business, and two more trucks are soon to be put into service on the same line.

### May Unionize Bus Drivers

NEW HAVEN, CONN., Jan. 19—Inauguration of plans to organize the motor bus drivers of the state into a labor union was the principal business at a meeting of the executive board of the Connecticut branch, American Federation of Labor, in this city Saturday. It was reported that the number of motor bus operators is constantly increasing, notwithstanding unfavorable local motor bus legislation. Some of the bus owners operate their own machines, it was reported, but there are hundreds of drivers who are wage earners and are recognized as such by the American Federation of Labor.

### Trucks Collect Produce

PERU, IND., Jan. 25—The Miami Produce Co., organized in this city last April, now operates a fleet of fifteen motor trucks that cover nine counties in the collection of country produce. The distribution of this produce is confined to New York.

It is the plan of the company to expand the territory in which it deals with farmers. The produce is handled in two plants, one being at Rochester, Ind., and the other in this city.

## Coming Events

- Jan. 29-Feb. 12. New York City. Electric truck Show at 15th Street and Irving Place, under auspices of New York Edison Co.
- Feb. 7-12. Columbus, O., Truck Exhibition at National Tractor Show to be held in Coliseum.
- Feb. 9-12. Chicago. Eleventh American Good Roads Congress and Twelfth Good Roads Show by American Road Builders Ass'n.
- March 12-19. Boston, Mass., Truck Show in Armory, Boston American.
- March 1-5. Wilmington, Annual Motor Truck Show under auspices of Wilmington Motor Trade Ass'n, in Auditorium.
- March 14-17. Pittsburgh, Pa. Convention to be held at William Penn Hotel by International Retail Delivery Ass'n.

## Utah Association to Protect Owners

### Will Issue Credit Ratings of Contract Bidders and Give Financial Aid to Firms

SALT LAKE CITY, Jan. 15—A meeting of fifteen truck owners and operators took place Jan. 14 in the Salt Lake Commercial Club Building to witness the formation of the nucleus of an organization that is to be known as the Utah Truck Owners and Operators Assn. Roy N. Dundas, former newspaper man and now operator of a fleet of trucks, was elected temporary chairman.

The association was formed for co-operative purposes and the protection of truck owners in the State. By-laws will be compiled and plans are being formed for the establishment of a downtown office where the secretary and business agent can lend assistance and advice to vehicle owners. The organization is formed solely for business purposes. While not a money making institution, its efforts will be turned toward assisting the trucking industry.

Revenue for its operating expenses will be derived from initiation fees and it is ultimately planned to establish a co-operative banking system. Advice will be given as to the financial status of persons and firms asking for bids on trucking contracts and a sinking fund will be arranged whereby money aid can be assured truck operators who have not sufficient capital to advise the acceptance of a contract.

### Open Bus and Truck Service

OREGON, ILL., Jan. 25—Motor bus and truck service has been established between Oregon, in Ogle County, Illinois, and Mt. Morris, in the western section of the same county, 10 miles distant. Depots and waiting rooms have been leased for the accommodation of shippers and the traveling public.

BLOOMINGTON, ILL., Jan. 18—The Bloomington-Champaign Motor Truck Co. has been organized by Kauffman brothers of Bloomington, Ill., and will make daily trips between those cities, a distance of 50 miles. A truck leaves Bloomington and Champaign at 8 a. m. and requires 2 days for the round trip. All cities intermediate on the line of the Big Four railway and all farm houses on the route will be served with freight or express. Two trucks will be operated at the outset and if the business increases, this number will be increased.

### 22.5 Hp. Engine on Velie 1½-Tonner

The horsepower of the four-cylinder Continental 3¼ x 5 engine used on the Velie 1½-ton truck is 22.5 instead of 19.6 hp. as given in the specification tables on pages 353 and 368 of the Jan. 1, 1921, issue of THE COMMERCIAL VEHICLE.



# The COMMERCIAL VEHICLE

Read by Fleet Owners

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President

W. I. Ralph, Vice-President

E. M. Corey, Treasurer

A. B. Swetland, General Manager

U. P. O. Building

231-241 West 39th Street, New York

## CONTENTS

Vol. XXIV, No. 2

Feb. 15, 1921

### LEADING ARTICLES

Clean Up Your Shop.....	33
What Is Necessary for Regrinding Cylinders and Crankshafts .....	40
The Battle Against Snow—11—Snow Drift Prevention .....	45

### MISCELLANEOUS ARTICLES

"Roloff" Body Equipment.....	36
Truck Driver Wins \$500 Cash Prize.....	38
Reconditioning Trucks at the Factory.....	39
Costs Cut in Half with a Semi-Trailer.....	48
Is Your Truck Life Estimate Too Low?.....	49

### DEPARTMENTS

Rear Axle Repair and Adjustment—7—Sheldon Worm-Driven Axles.....	42
The Better Way.....	50
Three-point Mounting of Chassis a Feature of New ¾-Ton Service Truck.....	54
Shop Equipment.....	56
New Accessories and Parts.....	58
Motor Truck Electric System Wiring Diagrams..	60
The Fleet Owners' Forum.....	62
The Editor's Viewpoint.....	66

### NEWS

Over 1 Billion Tons of Freight Handled.....	67
Prohibitive Tax for New York Trucks.....	67
Gasoline Prices Drop Throughout Country.....	68
Wilmington Merchants Need Truck Routes.....	68

INDEX TO ADVERTISERS.....72-73

## The Commercial Vehicle

Charles W. Blackman, General Manager

EDITORIAL DEPARTMENT

David Beecroft, Directing Editor

Ray W. Sherman, Executive Editor

Joseph Husson, Editor

F. E. Spooner and Sinclair Gluck

Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

Chicago, Mollers Building, 59 East Madison Street  
Detroit, 317 Fort Street West Cleveland 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law.....	50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



# "NORMA"

## PRECISION BALL BEARINGS

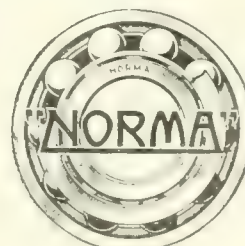
(PATENTED)

The present high costs of labor and materials make the up-keep and repair charges on cars and trucks a serious consideration. A larger service output, with less attention input, is demanded from them today than ever before. And those which are most creditably meeting the conditions are—almost without exception—those which carry "NORMA" equipped ignition apparatus and lighting generators as standard equipment.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings



## MAKE COMPARISONS

Turn to "Motor Truck Specifications" and see for yourself how much larger and better Gary trucks are than other trucks of the same rated capacity—and after you have learned what Gary users know, please note that Gary prices are **below the average** of over forty different makes of heavy duty worm drive trucks.

We have some open territory.

We can make immediate deliveries.

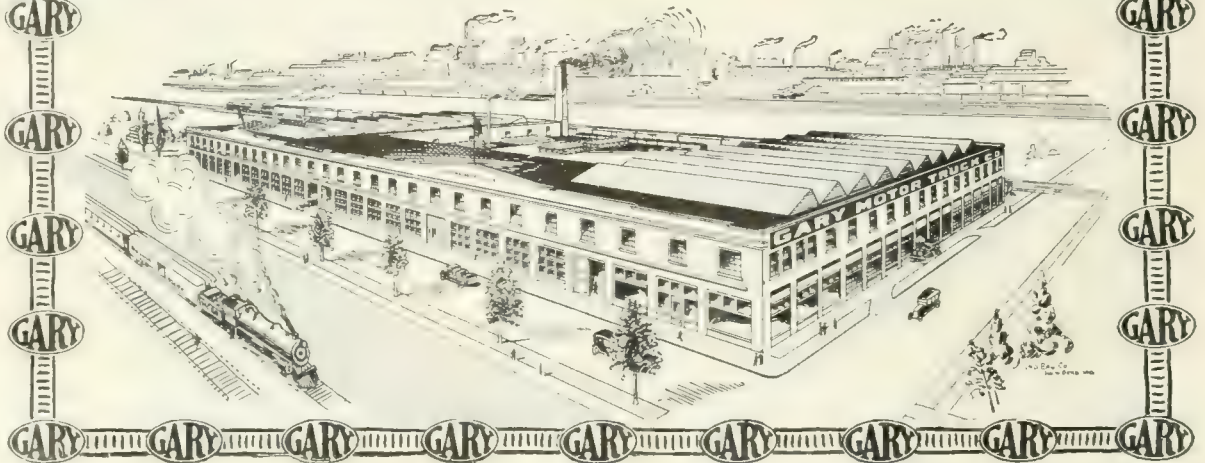
Our proposition to dealers is the most liberal to be had anywhere.

Write or wire today.

### THE GARY MOTOR TRUCK CO.

900 Taft St., Gary, Ind.

1, 1½, 2½, 3½ and 5 ton. Special Motor Bus. Special Farm Wagon. Special Tractors.



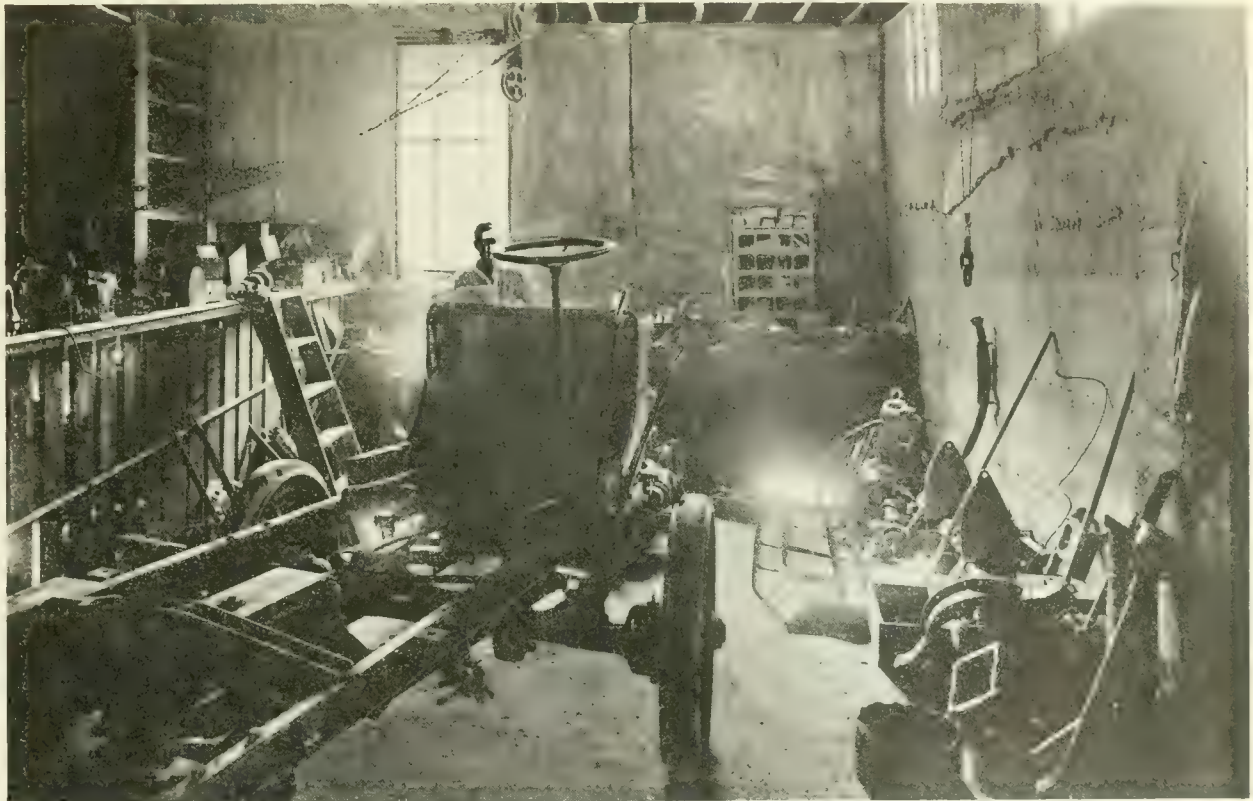


# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXIV Feb. 15, 1921 No. 2

## CLEAN UP YOUR SHOP



### *Is YOUR Shop Like This?*

**C**LEAN up your repairshop!

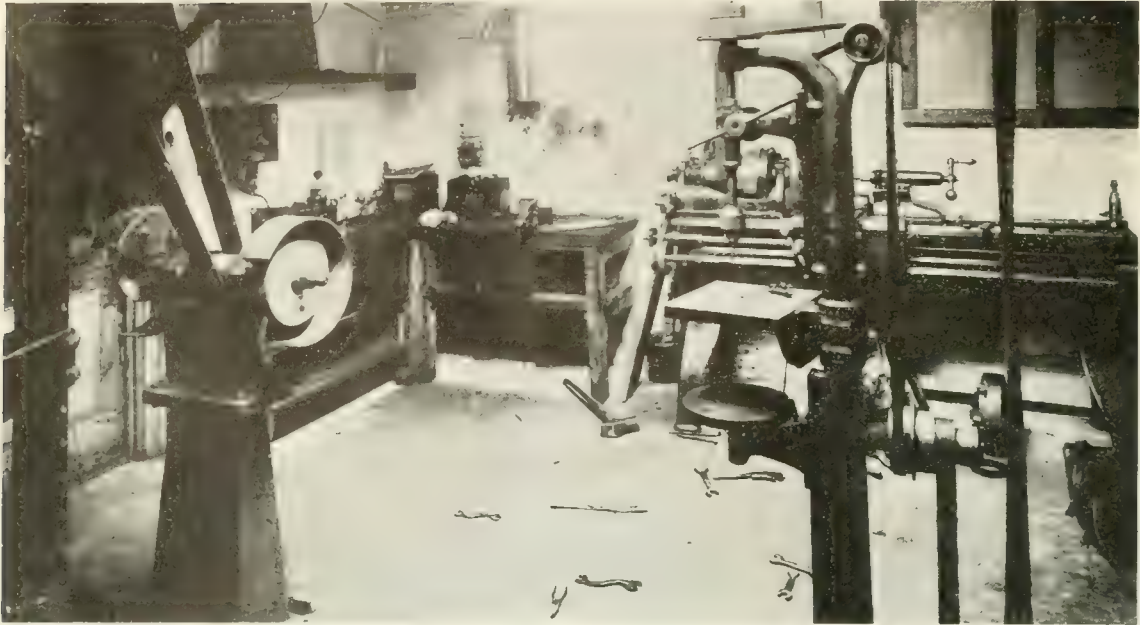
Dirt and disorder mean a useless waste of time, energy and money! Spring will soon be here. With the coming of the green leaves and the flower buds, it is human nature to want to spruce up a bit.

Make a resolve to clean up your shop now—and keep it clean.

There are two kinds of cleanliness. One is a freedom from physical dirt—grease, oil and dirt on the floor and dust and greasy waste on the bench and dirt and grit on the spare parts and supplies in the stockroom. The other cleanliness is a freedom from disorder; from a cluttering up of the repairshop itself with worn parts, tools and other equipment which get in the workman's way and multiply the steps necessary to complete a job.

Both kinds of cleanliness mean better and cheaper truck repairwork.

# Why Dirt and Disorder in the



*Tools on the Floor Waste the Mechanic's Time*

## CLEAN up your repairshop!

Dirty truck repairshops are like dirty people. No one thinks much of a man who is dirty. Wise is the man who makes a clean appearance even though his work is dirty. Wise also is the truck maintenance superintendent who will make a clean repairshop out of one which is dirty. Dirt in any of its forms cannot be hidden, and the truck maintenance superintendent must bear in mind that his character is often judged by his superiors by the condition and general appearance of his repairshop.

Any superintendent whose ambition it is to climb higher in the great craft of motor truck maintenance must first of all be certain that the repairshop in which the men under him work is clean.

Now is the time to clean up. Spring is the time when we unconsciously appreciate the passing of the cold winter weather and the coming of the green grass, the leaves on the trees and the balmy warm air. Cities have their "clean up days" in the spring by the proclamation of the mayors or other public officials and experience has shown that the average person responds to the appeal to "clean up" to a greater extent in the spring than in any other season in the year.

So now is the time to clean up your truck repairshop. The clean up has a real dollar and cents value. It has no imaginary advantages. Clean repairshops mean better and cheaper truck repairwork. There are two kinds of dirt in the truck repairshop. These may be described most briefly by physical dirt and disorder. Both are due in many cases to

## By Joseph Husson

pure carelessness or thoughtlessness. From dirt on the human body to dirt in the truck repairshop, we pass from ordinary dust in the air collected on the body through perspiration to dust and dirt collected on the work bench by its oily surface; greasy waste thrown down anywhere instead of being collected in a receptacle provided for it, and deposits

### Ten Minutes a Day for Cleaning Up

Adam Horr, maintenance superintendent for the truck fleet of Adolph Gobel, Brooklyn, N. Y., keeps his repairshop clean by ringing a gong every night ten minutes before quitting time to allow his mechanics to clean up their workbenches and put away their tools, so that work can be begun promptly the following morning.

### Try It Yourself

of grease or oil on either the workbench or floor or even on the shop windows and walls.

All these forms of dirt have a direct bearing not only upon the kind of repairwork turned out in shops where such conditions exist, but also upon the workmen themselves. Tests have repeatedly and conclusively shown that workmen perform better work in clean surroundings than in dirty ones. This is a most important consideration, for upon it depends the contentedness of the workmen. When a workman is not contented, he is

more likely to slight his work but when workmen as a body are contented, there can be built up an *esprit de corps* or organization spirit, the results of which are sometimes almost unbelievable in times of great stress. When a workman is contented he often does small tasks for which he believes he is not paid and thus moves up on the ladder of his own success and becomes a more important individual in his company organization.

When the truck mechanic is contented there is less liability to be labor trouble. And labor troubles are always expensive. It may cost several hundred dollars to properly train a truck mechanic and make him expert in the work given him to do. If he is discharged or leaves because of discontentedness, the money spent in training has been wasted and must be spent a second time in breaking in the new man.

Aside from the advantages of cleanliness for the workman himself, it is also necessary to consider the better and quicker work which may be turned out amid clean surroundings. When benches, floors and tools and equipment are kept clean, better work can be done and fewer accidents result due to slipping tools or parts being worked upon.

When better work is done on any part undergoing repair, the result of that better work is transferred to the truck chassis when the part is replaced. When better repair work is done on the parts comprising the truck, need for subsequent work is lessened and repair costs accordingly reduced.

To reduce repair costs and keep the truck in workable condition for the greatest possible time each year is the ultimate goal of the maintenance super-



# Shop Make Repair Costs High

intendent. Since a clean repairshop will help reduce repair costs, the progressive maintenance superintendent should first of all see to it that his shop is clean.

It should be clean whether the shop has one piece of equipment and a dozen tools or many pieces of machinery and a most complete outlay of tools. When the shop is once made and kept clean, better equipment and tools and better operating methods will come later.

## White Walls Help

It is surprising how whitewashed walls add to the general appearance of cleanliness when the whitewash is applied regularly to eliminate greasy handprints and accumulation of dust. Walls painted white are as desirable and may be washed down with soap and warm water once in a while to save repainting.

To keep a repairshop clean, it is necessary for the maintenance superintendent to first of all convince himself that it pays to have a clean repairshop and then get this same idea home to every one of his men, even the lowest paid helper in the organization.

Everything should be done to make it as easy as possible for the workmen to keep their shops clean. Receptacles should be provided for greasy waste which has outlived its usefulness; drip pans should be provided under all draw-off stations for oil and special places such as compartments, drawers, chests or boards provided for tools.

Adam Horr, maintenance superintendent for the fleet of trucks owned by Adolf Gobel, Brooklyn, N. Y., has worked out a very satisfactory yet simple plan for making it easy for his mechanics to keep their repairshop clean. Every night at ten minutes before quitting time, he rings an electric gong in the shop which is a signal for the men to quit whatever

job they are working on, pick up all their tools; clean up the workbenches and floor and put the tools away in their proper places. This serves to prevent the loss or mislaying of tools by the night washers and permits the mechanic to begin work immediately the following morning without having to chase all around the shop to locate the tools he needs.

Disorder in a truck repairshop is almost as bad as physical dirt and helps as much if not more to increase the cost of repairs. When tools used in the shop are kept in a disorderly manner, this condition multiplies the number of steps required to complete any given job. This

in turn increases the cost of the repair and subsequently the monthly or yearly cost of maintenance per mile covered.

The same results develop when spare parts and supplies are kept in a disorderly manner. Then they are hard to get at, the cost of getting the new part to the truck and the old part away from it bears too large a proportion to the total cost of the job including the cost of actually doing the work. When parts are kept in a disorderly manner and handled in the same way, the mechanics are continually getting into each others' way and all of this adds to the cost of the work.



*Crowded Quarters Mean Expensive Repairs*



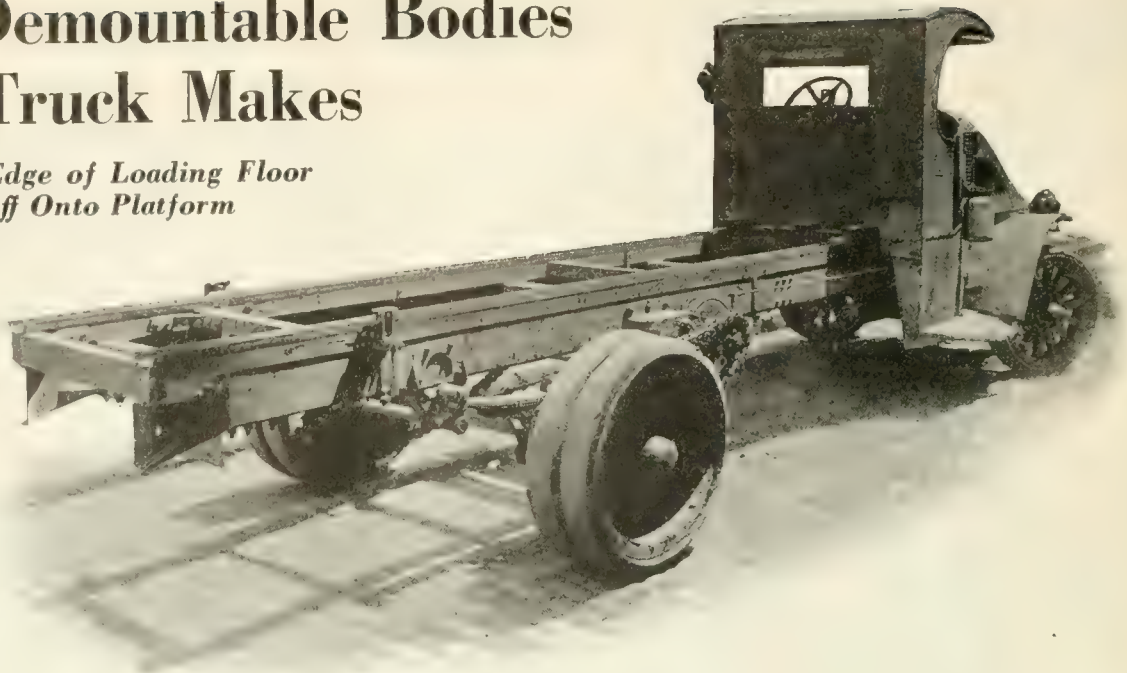
*Grease and Oil on the Floor Mean Short Tire Life*



# Roloff Demountable Bodies for All Truck Makes

**Truck Locks to Edge of Loading Floor  
and Body Rolls Off Onto Platform**

*This is the truck chassis, as equipped to take the Roloff demountable body. Note the guiding tracks for the body carriage wheels and the V-shaped slots at the end of the frame. As it stands, the chassis is ready to leave the warehouse on 3 minutes' notice*



**W**ITH the great increase in the use of commercial vehicles have come inevitable developments along lines of increased efficiency. This increased efficiency has shown itself first in the development of better trucks as regards accessibility, long life and low maintenance costs. But it has also shown itself in the adaptation of new or better methods of loading and unloading in which this otherwise idle truck time is cut to the lowest possible minimum, and the truck thus permitted to develop its highest operating efficiency.

**A**MONG the latter developments one of the most important from an efficiency point of view is the increasing use of demountable bodies. This method of increasing the efficiency of a truck is not applicable in all cases. But where it is applicable, it has been one of the most potent factors in the battle against the rising cost of operation.

In answer to the increasing demand, there have been several different types of demountable bodies designed. One of the latest and most highly specialized is the Roloff equipment illustrated on these pages and manufactured by the Perin Automotive Engineering Co., Inc., Brookline, Mass.

The main difference between Roloff equipment and other types of removable bodies is that Roloff bodies are never lifted. The chassis is automatically brought to the same level as the tracks in the shipping floor when the truck backs up, and is automatically locked there while the body is being moved. The body always rolls in a horizontal straight track.

This levelling of the chassis is accomplished by means of a wedge-block assembly, set in the face of the shipping platform, as shown in the illustration at the bottom of page 37. This locks into the V-block assembly bolted to the rear end of the truck chassis. In operation

it is somewhat similar to a ferryboat slip, except that when the chassis backs up and the wedges enter the Vs, the chassis frame is lifted or depressed on its springs, according to whether the body is full or empty.

## Springs Take Shock

In either case, the shock of the chassis meeting the platform is transmitted to the chassis springs and is completely cushioned by them. The latch in the center of the wedge-block assembly is automatically depressed as the truck backs up, and snaps into place behind the rear part of the V-block casting as soon as the tracks on the chassis come level with those in the shipping platform. This latch takes the place of pins in the wedge-blocks and holds the chassis in place while the bodies are being exchanged. The latch is released by a pull on the handle at the left of the assembly, which operates through the bell-crank lever to pull latch down by means of the chain.



*The wedge-block assembly, by means of which the chassis is locked to the platform at the proper level*



*The cam handle on the latch on the sub-frame which locks and releases the carriage*



*Close-up view of the wedge-block assembly, showing how it fits into the V-shaped spaces on the truck*



The wedges fold into the face of the platform, so that they will not project and strike pedestrians when not in use. These wedge-block assemblies can be fastened to any type of platform or building, and the V-blocks can be bolted to any size of truck, regardless of the width of the frame.

### The Sub-frame

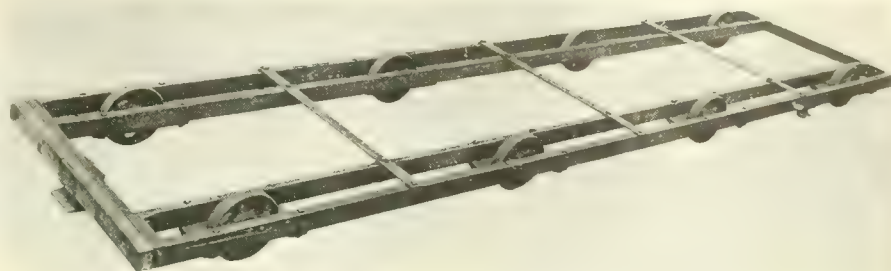
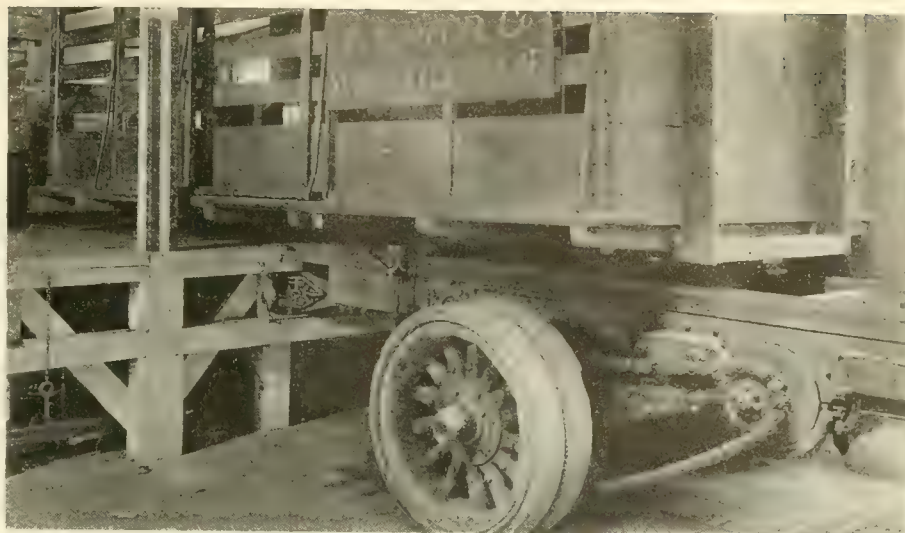
The company manufactures sub-frames which, together with the V-blocks, can be quickly fastened to any chassis. This sub-frame carries the tracks in which the wheels of the body roll, together with the automatic latches which lock the body to the chassis when the body rolls into place. The sub-frame is rigidly fastened to the chassis and is bolted to the rear cross member of the V-block casting, which is also bolted fast to the chassis frame. The sub-frame and V-blocks can be attached to any chassis.

The company does not build bodies but instead supplies the framework, called the carriage, upon which as a foundation, any body builder can construct any type of body desired. Or the carriage can be fastened under any existing body that the purchaser may have. The carriage or frame is constructed of channel steel filled with white oak. The wheels are carried by cast steel brackets and mounted on hardened steel axles with Hyatt roller bearings. The carriage also carries catches of cast steel which fit into the latches on the sub-frame.

When on the chassis, the body is secured in three places, one at the extreme front of the body in the center and the other two on opposite sides of the body near the rear end.

The front stop is made with a slight bevel, so that when the one on the carriage slides under the one on the front end of the sub-frame, there is a wedging action and the carriage is sprung down tightly against the tracks fastened on top of the sub-frame.

The two side catches are shown in the illustration at the top of page 36. These latches are operated by means of handles which operate cams. Raising the cam handle on each latch on the sub-frame



*Upper—Demountable body halfway between chassis and platform. Lower—The carriage on which the demountable body travels. These carriages are made with four, six or eight wheels, according to the size of the body*

throws the latch open. When the handle is down, the latch is always forced into the locked position by a strong spiral spring. Thus the body is held securely.

### How System Works

The operation of the system is as follows: When the driver returns from a trip, he backs his truck into any set of wedge-blocks where there is an empty track. The drivers very quickly become skillful at this and seldom miss it on the first try. When his truck is all the way

back, the wedge-block latch automatically holds it in place and the driver jumps down from his seat and opens both latch handles on the sides of the sub-frame. The driver and helper then push the body onto the shipping floor. The helper next puts down the latch handles on the sub-frame and releases the latch on the wedge-blocks.

When the body is off the chassis the driver backs his empty chassis into the wedge-blocks in front of the next body  
(Concluded on page 65)



*This is a view of the loading platform at the Ginter Co. warehouse where the demountable bodies are loaded and rolled onto the trucks. Note the four wedge-block assemblies let into the platform, for adjusting and locking the chassis to the loading platform tracks*



# Truck Driver Wins \$500 Cash Prize



## *High School Graduate Who Drives Truck for Father in Public Trucking Business Wins Contest at Recent New York Highway Transportation Show*

**T**HOMAS F. McGRATH, license number N. Y.-7688, has been awarded the \$500 cash prize for the Truck Drivers' Contest conducted during the week of the Highway Transportation Show in New York City from Jan. 3 to 8, 1921.

Mr. McGrath, whose picture is shown on this page, is a high school graduate who drives a truck for his father, P. J. McGrath, doing business as a public truckman at 476 East 138th Street, New York City.

The prize was offered by the Motor Truck Assn. of America, under whose auspices the Highway Transportation Show was held. All drivers who visited the Highway Transportation Show, no matter in what states they were licensed, were eligible to join the contest.

According to the rules of the contest, the prize was to be awarded to that driver in attendance at either of the two armories in which the show was held, who best explained in not over 250 words the "Ten Best Points of Quality" of any motor truck on display in the two exhibition buildings.

Several hundred contributions were submitted and turned over to the three judges, Coker F. Clarkson, Society of Automotive Engineers; H. R. Cobleigh, National Automobile Chamber of Commerce, and William B. Doron, Firestone

Ship-By-Truck Bureau, New York City. The judges ruled that McGrath's contribution outranked all of the others submitted by at least 10 per cent.

### **To Award Prize Feb. 23**

The prize will be formally awarded at the next meeting of the Motor Truck Assn. of America to be held at 8:30 p. m. on Wednesday, Feb. 23, 1921, at the Automobile Club of America, 247 West 54th Street, New York City. The prize will be presented by Theodore D. Pratt, manager of the Highway Transportation Show and general manager of the Motor Truck Assn. of America.

McGrath selected the Ward LaFrance trucks as the basis for his contribution, which is as follows:

### **Ten Points of Quality**

**Frame**—The long deep sectioned frame and plenty of cross supports feature flexibility and strength.

**Motor**—It is a two-block motor with large valves and a long stroke and a heavy crankshaft with large bearing surfaces, making a heavy duty, high powered motor of wear resisting quality. Removable heads afford access to cylinders.

**Forced Lubrication**—Forced lubrication provides positive and sufficient lubrication at all motor angles and operation

of system is continually shown on oil pump gage on dash.

**Cooling System**—Adequate motor cooling and thorough carburetion is assured at varied temperatures by using radiator shutter, thermostat, water pump and adjustable fan.

**Ignition**—A high tension impulse magneto furnishes quick starting and dependable ignition and the manual spark lever reduces carbonization and increases power and economy.

**Clutch**—The multiple dry-disk clutch provides easy and positive engagement and has long wearing qualities.

**Carburetion**—The hot air intake and hot spot reduce gasoline consumption and add power and the dash choke makes cold motor starting easier.

**Transmission**—Four speeds in the transmission give gear ratios for all road conditions without straining the motor while the mounting amidships prevents whipping of propeller shaft.

**Final Drive**—The full floating worm-driven axle embodies strength, minimum wear and adequate lubrication and the radius rods keep rear axle in alignment and leave the springs free for proper functioning.

**Lubricated Chassis**—The self-lubricated chassis assures constant and neglected lubrication to chassis points of friction.



# Reconditioning Trucks at the Factory

**The Acason Motor Truck Co. Plans to Recondition  
Its Own Trucks for Acason Owners at Detroit.  
Will Give Same Guarantee as on New Truck**

THAT the average life of the truck is about five years is an axiomatic principle more or less generally accepted in the trucking world. The principle has been established partly through actual experience and partly as an approximation on which to base truck depreciation costs, but has been by no means scientifically established. Therefore, like many other approximations for convenience, it has been questioned and is in considerable danger of being discarded altogether, as more scientific methods induce a more intensive study of the actual facts on truck life.

The theory is now held in certain quarters that even when certain truck parts have become worn and weakened to a degree that renders their further repair uneconomical, there still remain many parts in the truck which are as good as ever, and that, therefore, a reconstruction or reconditioning of the truck with the complete overhaul or replacement of the parts worn will still prove more economical than the purchase of a new vehicle. And if this reconditioning becomes a general practice the life of the modern truck will be still further lengthened to a considerable degree.

In this connection a plan formulated recently by the Acason Motor Truck Co., Detroit, is of interest to fleet owners generally. According to President Acason of that company, the idea that a motor truck must be sold as junk after four or five years of use is a wrong and wasteful theory.

## Many Parts Still Good

Mr. Acason maintains that there are a large number of component parts of good motor trucks which really never wear out or on which the wearing parts can be easily renewed.

Such parts as front axles, wheels, frame, frame castings, gasoline tank, steering gear, radiator, carbureter and magneto, transmission case, clutch housing, etc., represent quite a large proportion of the value of a truck and are just as good at the end of four or five years as they were in the beginning.

He goes on to say that the motor, with a large number of moving and consequently wearing parts, needs overhauling and replacement from time to time, as is only reasonable. Tires, of course, have to be replaced and springs will eventually lose the major portion of their usefulness. Transmission gears may wear badly and require replacement. But there is no justification for practically throwing away so much other valuable material that does not wear

out at all, merely because of the wear in the above mentioned parts.

## The Acason Company Plan

In view of these facts the Acason company proposes a plan to owners of Acason trucks to recondition these trucks at the end of the period of their apparent usefulness. That is, at the end of the period when ordinary repairs on the trucks cease to be economical.

The Acason company claims that it has perfected a plan for the recondition-



## Trucks Rebuilt at Factories

This story describes the new plan of The Acason Motor Truck Co. for the rebuilding of worn out trucks for Acason truck users.

The plan is a new departure in the motor truck world.

It may have an important influence on future repair developments, if generally adopted.

For this reason a consensus of opinion on the plan would be of great general interest to fleet owners.

Write to THE COMMERCIAL VEHICLE and tell us what you think of it!

## Will It Be Adopted?



ing of Acason trucks at its plant in Detroit. This plan has been announced in writing to all owners of Acason trucks with an outline of the proposed plan. Acason trucks which are now running in various parts of the country and which are shipped back to the factory, will, according to the plan, be reconditioned and put in as perfect running shape as a new truck.

As a proof of this statement, Mr. Acason states that the factory's original guarantee as given on a new truck will, under the plan, be placed back of all trucks reconditioned in this manner at the plant in Detroit.

It is stated that locomotives have a life of from 20 to 30 years, simply because they are properly reconditioned and properly cared for. In the same way, Mr. Acason believes that modern motor trucks should have a much longer life than the present approximate life of four or five years and he intends to prove it under his reconditioning plan.

In a recent letter Mr. Acason states that this reconditioning plan has become more or less of a standard business practice in Europe as a result, probably, of the trucks left over from the war. Several large and well known

factories in Europe are employing their entire facilities in reconditioning work at the present time. The custom there is for any one factory to specialize on not more than two or three different makes of trucks.

As regards the details of the plan, one of the first points of interest is the question of the length of time required to rebuild or recondition the trucks. On this point Mr. Acason points out that the length of time, of course, depends on the condition of the truck, but the actual work of rebuilding will not exceed from 1 to 2 weeks. If it is considered advisable to install a complete new engine, the work can probably be done in 1 week or less, because the longest operation would be the overhauling and rebuilding of a worn-out engine, if that were done. The company finds, however, that if the engine is in very bad shape, it is cheaper to install a new engine than to undertake the great expense of repairs on the old one.

Mr. Acason points out that a truck can be completely disassembled in one day and can be rebuilt equally as quickly after the various units have been either replaced or repaired.

As regards cost, the company states that it can give an estimate upon inspection. A final invoice is arrived at from the value of the material issued and the time expended, but an estimate can be made which will not be far from the correct amount.

## The Transportation Question

Mr. Acason states that freight shipments are moving very quickly these days, while in some cases trucks can be driven into the factory and driven away after being rebuilt or they can be shipped in and driven away.

As a typical example, Mr. Acason states that, under present railroad conditions, a truck shipped from New York should arrive in Detroit in about 10 days' time on an average. Allowing the company a maximum of 2 weeks at the factory and 10 days for freight shipment, or 6 or 7 days for driveaway, the average length of time that the truck would be out of service would be 4 or 5 weeks.

Mr. Acason goes on to say: "Compared with this you will agree, I think, that if this same truck is turned over to the average garage for the average general overhauling, the owner is usually out the use of his truck for at least this length of time and has little guarantee of a thoroughly satisfactory job even at the end of this period, whereas the same length of time devoted to factory reconditioning would give him his truck back in guaranteed first-class condition."



# What Is Necessary for Regrinding Cylinders and Crankshafts

*A Technical Article Describing How to Regrind Cylinders and Crankshafts and Giving the Equipment Necessary and the Prices Charged for the Work*

By H. F. Podhaski

**B**ECAUSE of the highly specialized nature of cylinder and crankshaft regrinding work, the average fleet owner's service station, garage or repairshop is not in a position to do such work. It is a business that requires expert knowledge and an investment scarcely justified by the amount of work that would be required in most truck repairshops. Even in the largest repairshops there is generally not enough work of this nature to permit the maintenance of a staff of mechanics who are specialists in the various operations necessary in connection with cylinder and crankshaft grinding.

And certainly the best results can only be obtained through specialization. It is necessary in a work so important that the heads of the organization, as well as the mechanics, should give the work their undivided attention in order that satisfactory results can be obtained. If the heads of the organization and the mechanics, too, divide their attention between the general run of repairshop work and cylinder and crankshaft grinding, certainly neither line will be handled as satisfactorily or as efficiently as if both were handled by expert specialists. It would be like an ordinary doctor performing a delicate operation in the patient's home, instead of the patient going to a hospital under an expert surgeon's care. In either case it would be more or less of a risk as to whether the work would turn out successfully.

## Specialization Needful

Thus it is that only by means of specialization—doing the one thing and doing it well—can the best results be obtained in a technical, delicate and intricate work such as cylinder and crankshaft grinding. And it was to specialize entirely in work of this nature that the Ragan-Scales Co. has organized and now operates its new plant in Atlanta, Ga.

Announcement of the new enterprise will be especially interesting to fleet owners in the various Southeastern states, for the company caters mainly to large users of trucks such as the Gulf Refining Co., the Georgia Railway & Power Co., the American Railway Express, the Texas company, and others, who, realizing that a specialized and expert service of the nature the new plant

is able to render enables them to save thousands of dollars in the operation of their trucks and other motor cars, are already patrons of the Ragan-Scales company.

The new plant of the Ragan-Scales company is probably the only one of its kind in the South specializing entirely in cylinder and crankshaft grinding, though there are many repairshops and service stations partially equipped, at least, to handle this sort of work. Special machinery—and mighty expensive machin-

dition to crankshaft grinding it will also take almost any round piece of work; it is large enough to take care of a large roll.

**Heald cylinder grinder;** Heald Machine Co., Worcester, Mass.

Only cylinder grinding is done on this machine; it is built especially for internal grinding where accuracy of the work is of the greatest importance.

**Brown & Sharpe piston and pin grinder;** Brown & Sharpe Mfg. Co., Providence, R. I.

In addition to piston and pin grinding this machine is also used for grinding cutters and reamers.

**Brown & Sharpe No. 3 universal miller.**

This machine is for making gears; it cuts any gear or any kind of worm; mills tops of cylinder blocks, crankcases, etc. Has a variety of similar uses.

**Hendey lathe;** Hendey Machine Co., Torrington, Conn.

For roughing out counterbores and pistons.

**Monarch lathe;** Monarch Machine Tool Co., Sidney, Ohio.

For general small work of almost any kind ordinarily done on a lathe.

**Acme turret lathe;** Acme Machine Tool Co., Cincinnati, Ohio.

Makes pistons, etc. Turns out about four per hour, semi-finished; after leaving this machine they are ready for the grinder.

**Weigel drill press;** Weigel Machine Tool Co., Peru, Ind.

## For Drilling and Threading

For drilling and threading, full tapping and also facing piston pin bosses. Also used for boring out cylinder blocks in case too much metal is to be ground out; it does not do as delicate work as the regular grinder. After leaving here the block is ready for the grinder.

**Mechanics drill;** Rockford Machine Tool Co., Rockford, Ill.

Used for general drilling purposes.

**Keyway cutter;** National Machine Tool Co., Cincinnati, Ohio.

For cutting keys in gear hubs or any internal hole.

Additional special tools required, with names and addresses of their makers, are as follows:

Full set of Brown & Sharpe micrometers for outside work and set for internal use. Six micrometers of 1 to 6 in. registered from one-thousandth to ten-

## Prices for Cylinder Regrinding

Holes	2 1/2" bore and under 4"	4" bore and under 4 3/4"	4 3/4" bore and under 5 1/4"
1	\$11.50	\$12.50	\$13.50
2	22.50	25.00	27.00
3	33.50	36.00	40.50
4	43.50	45.00	50.00
6	63.00	67.50	73.00
8	81.00	85.50	95.00
12	118.00	125.00	135.00

5 1/2" bore and over—Special prices in each case.

The prices given above include: Grinding all cylinders of each lot to one size; furnishing and fitting new cast iron pistons; furnishing and fitting new piston rings. The rings will all be fitted to the cylinders and put on the pistons. Special quotations for cylinder grinding if new pistons and rings are not required.

ery, too, it might be added—is necessary in a plant of this nature. If the work is to be well and properly done, only machinery can be used that is made especially for it, and because of the delicacy of the operations the machine has to be very intricate and perfectly adjusted to the thousandth of an inch, and such machinery comes mighty high. That is doubtless the primary reason most repair shops and stations are not so equipped as the cost is prohibitive as compared with the amount of this business that the average shop has to do. Neither pains or expense have been spared by the Ragan-Scales company in equipping the new plant with the very best and most modern machinery available.

A list of the machines used in the Ragan-Scales company's plant, with names and addresses of the makers, are as follows:

**Landis crankshaft grinder;** Landis Tool Co., Waynesboro, Pa.

The capacity of this machine is 16 in. in diameter and 68 in. in length. In ad-



thousandth part of an inch. Brown & Sharpe Mfg. Co., Providence, R. I.

Dial indicator gauge; same as internal micrometers but does quicker work.

Set of gear cutters, of different pitches, etc., to get number of teeth required on different gears. Brown & Sharpe Mfg. Co.

Set of expansion reamers; first, for boring out piston holes and piston bosses; then they must be accurately finished and reamed by hand with these reamers.

Various jigs for the turret lathe for carrying complete operations from start to finish. Boring bars, tool holders, raised tools. A special jig has been devised by Mr. Ragan to insure piston pin holding absolutely parallel with top of piston, for if it does not do this, serious trouble may result.

Set of high speed drills running from one-sixty-fourth of an inch to one and one-half inch, inclusive, for the drill presses.

Also full set of taps and dies for threading and tapping, U. S. standard, coarse threads; S.A.E., fine threads.

Various sets of grinding wheels for use on the grinding machines and for different grades of metal. These are also of different sizes and bores and different cutting qualities, according to the texture of the metal.

A full stock of piston rings which have to be especially fitted for each job.

A gas blower furnace, built for the purpose, combining gas and air, is also part of the equipment. It runs up to a very high temperature and is used for heat treating piston pins and a hardening process to relieve any strain in the metal. The first heat is 8 hrs. and the second heat 10 hrs. This process hardens the steel all the way through which is a much better process than that of the case hardened pin.

## Other Equipment

Other equipment includes a set of socket and end wrenches and a power hacksaw and hand hacksaws, the former made by Armstrong-Plum Mfg. Co., Chicago. These latter are for cutting off metal. There is also a stock of facing-off tools for facing piston bosses.

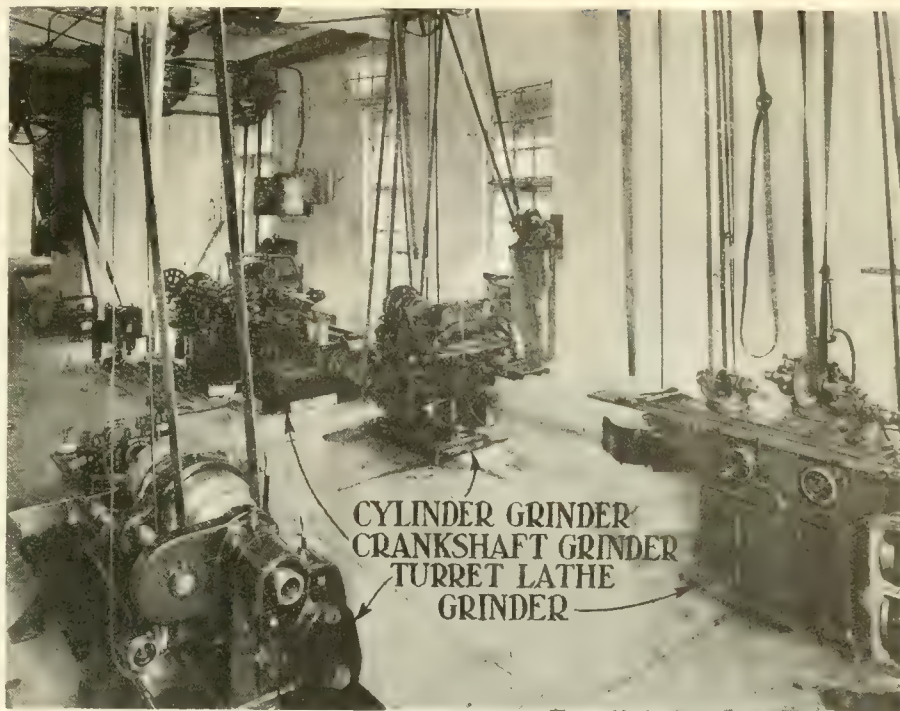
The cost of regrinding a four-cylinder block of the different sizes is given in the table on page 40.

Crankshaft grinding is done at the rate of \$2.50 per bearing. No job is done for less than \$5. All shafts are wet ground on the Landis crankshaft grinder.

The object of cylinder regrinding is to restore the inside of the cylinder to a round, smooth surface that is perfectly straight and at absolute right angles with its base.

Like cylinder grinding, crankshaft grinding is a perfected method of making the journals of a crankshaft perfectly round, so that the bearings may be fitted with absolute accuracy. A bearing knock in a motor is just as unsatisfactory as a piston slap.

The regrinding of cylinders is not claimed to materially increase the power of the engine—that is, to increase the



*View of the layout of the regrinding shop, showing the larger power-driven mechanical tools used in the various regrinding operations*

power over that for which it was previously designed. But regrinding does have a desirable effect on the engine power in that it restores it to its former normal condition. Motor truck owners always note an increase in power after having their cylinders reground, but this is only because the cylinders have been restored to the condition in which they originally left the factory, or at least as nearly restored as possible. When done right, and cylinder regrinding can only be done right by specialists with the aid of special machinery, most engines that have already seen 20,000 or 30,000 miles of service can be restored to the same power they had leaving the factory.

Furthermore it is generally found that gasoline and oil consumption is reduced from 25 to 50 per cent by the right sort of cylinder regrinding. When pistons are loose or piston rings improperly fitted the gasoline can pass down into the crankcase before the explosion. This means a loss of gasoline and at the same time thins the oil in the crankcase. And when the oil is thinned in this way it is easily pumped to the top of the piston where it is burned.

It is evident that something is wrong with the cylinders when the gasoline or oil consumption is out of proportion with the power delivered, or when the engine is smoking or the pistons slapping. The motor has to be taken down before it can be determined exactly what the trouble is. And in a great many cases, when the motor is thus dismantled, it is found that there is too much clearance between the piston and the cylinder and the only remedy is regrinding.

To determine just when a cylinder does need regrinding certain special tools are required and this is another important point in carrying the work to a specialist, for the average repairshop is not

equipped with these sort of tools. There are some imperfections in worn cylinders that cannot be detected save with the aid of the most accurate tools specially designed for this purpose. For example, it is most difficult to tell whether the cylinder bore is at right angles with the base—at least, it is difficult to discover any imperfection in this regard by a casual examination. However, if the shop is equipped with a cylinder grinding machine, the cylinders can be placed thereon and it is easy then to determine if the base and bore register exactly at right angles by running the spindle of the machine down through the bore. It is indeed advisable when such conditions arise to call in the aid of a specialist, for in a shop thus thoroughly equipped and handling only this sort of work, it may mean the saving of hundreds, if not thousands, of dollars to the man or company operating a fleet of trucks where maintenance costs per year may reach into the thousands of dollars.

## How Cost Is Determined

The cost of the work is determined by averaging the actual cost to the company of a number of jobs, including wear and tear on machinery, time of workmen, etc., and a margin of profit added.

The minimum thickness to which the cylinder metal may be cut in regrinding operations is 3/16 of an inch; that is, there should be 3/16 of an inch of metal left in the wall to insure safety.

The capacity of the machines in the Ragan-Scales shops is three blocks of six cylinders each, or eighteen holes, in one day, but the work could not be assured of absolute efficiency as this would be too speedy an operation. The Ragan-Scales company does not try to exceed three blocks of four cylinders each in a day.



# Rear Axle Repair and Adjustment

*A Series of Articles to Assist Maintenance Superintendents in Carrying on Axle Repairs*

## 7—Sheldon Worm-Driven Axles

**S**HELDON worm driven rear axles are semi-floating construction and are designed on the locomotive principle. The wheels are fixed to the axle shafts and the axles turn with the wheels as in the case of the locomotive. The worm and gear are mounted on ball bearings which eliminates the necessity for adjustments. The repair and adjustment of these axles follow along a definite schedule of operations.

Due to the fact that there are two different types of hub mountings on the Sheldon rear axle, it would perhaps be best to discuss each type separately. These two types consist of a taper mounting where the rear wheel is keyed to the axle shaft and a hexagonal mounting where the rear wheel hub is held in position by means of two collets or wedges opposed to each other. A wheel puller arrangement is provided on both models.

### Tapered Hub Mounting

Instructions for using the wheel puller are as follows:

- 1—Jack up the axle.
- 2—Remove cap screws which fasten the hub cap to the hub flange.
- 3—Remove the hub cap.
- 4—Remove driveshaft nuts.
- 5—Unscrew and remove the plug in the end of the hub cap.
- 6—Replace the hub cap and cap screws and refasten it to the hub flange.
- 7—Insert the wheel puller screw (one of which is furnished with each axle)

in the end of the hub cap and draw it up until it jams against the end of the axle shaft.

8—Tap back of wheel.

the rim of the wheel on the inside after the set screw is jammed against the shaft. Once the wheel is started, there will be no need of using the set screw any further, as the shaft is tapered.

### Remounting Wheels

Before replacing the wheel on the shaft, put the key that fastens the hub to the axle shaft in position in the keyway and drive it up well against the wheel bearing. Place the hub over the shaft with the keyway in the hub in line with the key in the axle shaft and force it on as far as possible.

Place the smaller nut on the shaft and draw it up. Bump the hub flange with a heavy block or bar so as to seat the wheel hub firmly on the axle shaft, following it up with the nut. The function of the smaller nut is to jam the hub key against the inner cone of the wheel bearing, thus holding it firmly against the collar on the axle shaft. When the wheel hub is firmly seated, the outer end of the hub key should protrude about  $\frac{1}{8}$  in. beyond the end of the hub barrel, so as to make sure that the nut is actually "nipping" the key and not bearing against the end of the hub.

After the wheel hub is firmly seated and the nut has jammed the key tight against the wheel bearing, place the large nut over the small one and draw it up tight.

Remove the wheel puller screw from the hub cap and reinsert the plug, screwing it into the hub cap from the inside.

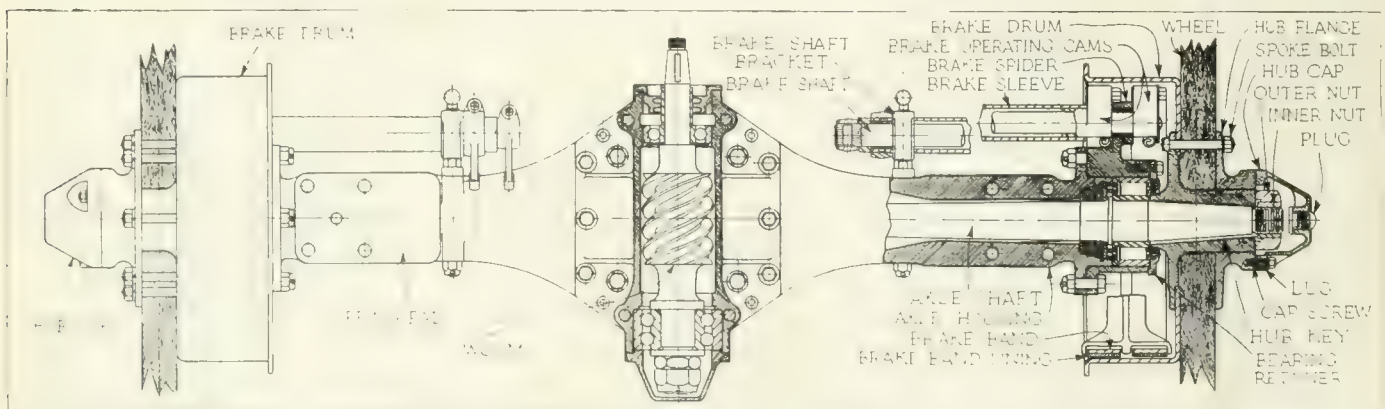
Replace the hub cap, fastening it to the hub flange with the cap screws, but first

### Axles Described in Previous Issues

*Maintenance superintendents who wish to refer to articles on axles that have already been described will find them in the following issues:*

- |                       |            |
|-----------------------|------------|
|                       | 1920       |
| 1—Timken . . . . .    | Nov. 1     |
| 2—Clark . . . . .     | Nov. 15    |
| 3—Packard . . . . .   | Dec. 1     |
| 4—Wisconsin . . . . . | Dec. 15    |
|                       | 1921       |
| 5—Ford (Bevel)        | Jan. 15    |
| 6—Ford (Worm)         | Feb. 1     |
| 7—Sheldon . . . . .   | This Issue |

**Caution:** Do not attempt to pull the wheel off by simply tightening up on the set screw; this alone will not do, as it would strip the thread off either the hub cap or set screw. Be sure to tap against



View of the Sheldon axle with the tapered hub mounting, showing the rear wheel keyed to the axle shaft. Sheldon worm-driven rear axles are semi-floating construction and are designed on the locomotive principle



making sure to place the lock washers under the heads of the cap screws.

The axle nut is locked by means of a lug cast on the inside of the hub cap. After the truck has been run 25 or 30 miles it is well to remove the hub caps and make sure that the nuts are tight and that no chuck has developed in the wheels. If any chuck has developed and the nuts are loose, it is due to the fact that the hubs were not driven completely into position when mounted. Then bump the hubs again with a heavy block or bar, tighten the nuts as instructed above, and replace the hub caps.

### Hexagonal Hub Mounting

To remove the wheels assembled on the hexagonal hub mounting proceed as follows:

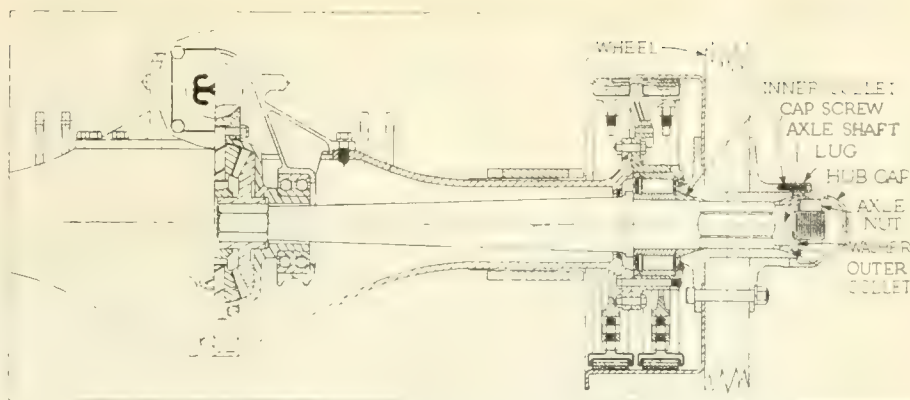
- 1—Jack up the axle.
- 2—Remove the cap screws that fasten the hub cap to the hub flange.
- 3—Remove the hub cap.
- 4—Remove axle nut, also washer if one is provided.
- 5—Insert a chisel in the slot of the outer hub collet and tap first on one side of the chisel and then on the other side with a hammer until the collet is loose and can be removed.
- 6—Unscrew and remove the plug in the end of the hub cap.
- 7—Replace the hub cap and cap screws that fasten it to the hub flange.
- 8—Insert the wheel puller screw in the end of the hub cap and draw up until it jams the end of the axle shaft.
- 9—Tap back of the wheel if necessary.

If the wheel does not come loose when the wheel puller screw is jammed against the end of the axle shaft, tap against the rim of the wheel on the inside. When wheel is once started it can be pulled off by tightening up on wheel puller screws.

The removal of the wheels, particularly on heavier models, can be facilitated by placing a greased board under the tire.

To replace the wheels:

- 1—Place the inner hub collet on the axle shaft and push it in firmly against the wheel bearing.
- 2—Place the wheel on the axle shaft and force it against the inner hub collet.
- 3—Place the smaller or outer hub collet on the axle shaft and push it into the wheel hub.



*View of the Sheldon axle with the hexagonal hub mounting, showing the method of holding the hub in position by means of two collets or wedges opposed to each other*

4—Place the washer on the axle shaft if one is furnished. No washers are used on some models, the flange on the axle nut being so wide that it makes a washer unnecessary.

5—Place the axle nut on the axle shaft and draw it up as tight as possible. This jams the inner cone of the wheel bearing between the collar on the axle shaft and the inner hub collet and jams the wheel hub between the two collets. Put on the hub cap which has a lug cast on the inside that serves to lock the axle nut. Be sure to place the lock washers on the cap screws before pulling them up.

If any looseness or play should at any time develop in the wheels it is because the hubs have not been firmly seated when mounted. It will then be necessary to tighten the axle nuts.

### Removing Worm and Carrier

The worm and wheel carrier comes out as a unit complete with worm gear, differential, etc. Before lifting out the carrier, the axle shafts must first be removed and the carrier unbolted from the axle housing.

To remove the worm gear and the differential carrier unit, proceed as follows:

- 1—Jack up the axle.
- 2—Remove both wheels.
- 3—Remove wheel bearing retainers at outer ends of axle housing.

4—Pull out the axle shafts. The wheel bearings will come with them and care should be taken to prevent dirt or grit from getting into them.

5—Disconnect the propeller shaft from the worm shaft.

6—Remove cap screws that fasten the worm gear and differential carrier housing to the axle housing.

7—The carrier assembly can then be lifted from the axle housing as one unit. This may be best accomplished by looping a chain or wire over the lugs or "ears" cast integral with the carrier housing at the sides and using a block and tackle or chain hoist to lift out the unit.

8—If the entire axle lifts up with the carrier, bump the housing lightly on each side of the carrier with a heavy bar. Do not use a small hammer or do not hit too hard.

9—Do not drive chisels or other sharp instruments in between the carrier and the housing, because it will spoil the gasket and injure the machined surfaces.

In reassembling, proceed as follows:

1—Remove the drain plug in the bottom of the axle housing and wash out housing and also the carrier thoroughly with kerosene. Be sure to clean the inside of the drain plug of all sediment.

2—See that machined surfaces of carrier and housing which butt together are perfectly clean.

3—Make sure gasket between carrier and housing is in perfect condition.

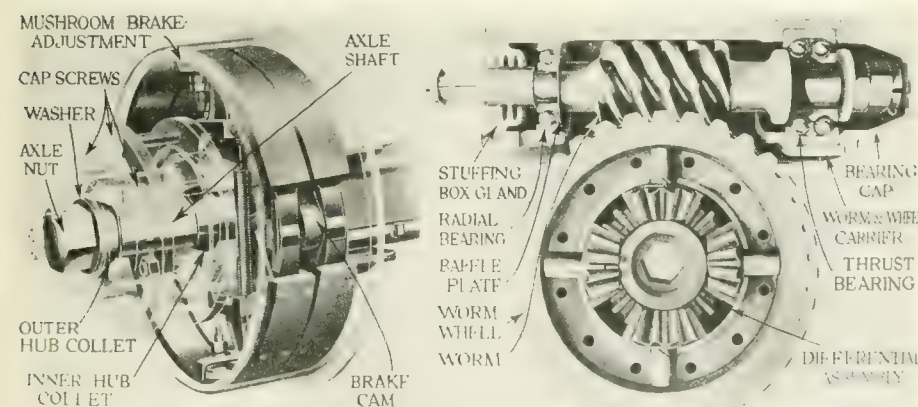
4—Set the carrier back in place, being careful not to bump the worm gears. Before installing a new carrier assembly, always revolve the worm wheel by hand to make sure that the worm rotates freely and that the worm and the worm wheel are in correct alignment. Never install a carrier unless the worm wheel can readily be revolved by hand.

5—Bolt the carrier firmly in place.

6—Put axle shafts back in place, making sure hex part of shaft is shoved well back in hex part of differential.

7—Replace wheel bearings, first washing thoroughly with clean kerosene. Before shoving bearing into position, pack the bearing, also the bearing seat in the brake spider, with grease. This grease will work into and through the bearing when you shove it back into place.

8—Put on wheel bearing retainers,



*Brake mounting on Sheldon hexagonal hub mounting*

*Design of worm and worm wheel assembly used in Sheldon axles*



making sure they are drawn up tightly in place.

9—Replace wheels.

10—Refill housing with new oil. Use good grade steam cylinder oil or special worm gear lubricant. Pour oil into filler until it overflows.

11—Run axle by hand by twisting on the front end of worm shaft to make sure that everything is in good condition before attaching the universal joint and starting the truck.

It should not be necessary to disassemble the worm gear and differential carrier unit during the life of the axle, unless for purpose of replacing a damaged part.

The ball bearings on the worm shaft and at the sides of the differential require no adjustment and the same applies to the worm shaft and worm gear which are located on permanent centers.

The worm wheel is bolted to the differential case with specially heat-treated cap screws and the nuts as well as the heads of the cap screws are locked with wires. The worm gears are centered when the unit is assembled by placing shims between the differential bearings and the legs of the carrier housing.

If it is necessary to remove the worm wheel and differential, the differential bearing caps should be marked and each cap reassembled on the same side from which it was removed.

In reassembling the worm wheel and differential the contact between the teeth of the worm wheel and the threads of the worm shaft may be ascertained by painting the teeth of the worm wheel at intervals with white lead or Prussian blue and revolving the wheel. When the contact shows the gears to be properly centered, the differential bearings should be shimmed at the sides before replacing the differential bearing caps so as to hold the worm wheel in this alignment.

All gaskets should be renewed if mutilated and thoroughly shellacked before reassembling the axle so as to prevent leakage of oil.

## Brakes

Sheldon worm-driven axles are equipped with brake pull levers, shafts and sleeves that are serrated. To tighten up the brakes loosen up the nut on the bolt which clamps the pull lever to the end of the brake shaft or sleeve, tap the lever off, move it back until the desired adjustment is secured and replace it. Be sure to tighten the nut on the clamping bolt, otherwise the serrations will be sheared and the levers will have no purchase on the shafts or sleeves.

The brakes on the lighter models are of the cam type. Where cast brake shoes are used it is only necessary to remove the studs on which the brake shoes are hinged, after which the shoes may be lifted off and the lining renewed. Where brake bands are used it is only necessary to spring them off the support brackets.

On the heavier models of axles toggle brakes are used, and to remove the bands it is necessary to take out the head pins with which the toggles are fastened to the brake band anchors. On these models, where large diameter brake bands are used, a mushroom adjustment is pro-

vided on each of the brake band support brackets so that the proper clearance may be maintained between the brake bands and drums and the brake bands firmly seated on the supports at all times, thus eliminating noise due to loose bands when the linings have worn sufficiently to make it necessary to take up on the brakes.

## Lubrication

Lubrication is provided for the worm gears, differential gears, worm shaft bearings and differential bearings by having these parts run in a bath of oil carried in the center housing. It is important to keep the oil level in the housing to the top of the filler spout. After the axle has been driven the first 500 miles and then every 5000 miles there-

after, drain off the old oil, wash out the housing thoroughly with kerosene and refill it to the level of the top of the oil filler spout with new oil. In warm weather use a good grade of heavy oil such as heavy steam cylinder oil or special worm gear lubricant. In extremely cold weather it may be necessary to use a lighter oil, inasmuch as it is important that the oil should remain fluid under the lowest temperatures experienced. Never use grease or any lubricant that will harden. The only other points to be lubricated are the brake rocker shafts and wheel bearings, where oil cups are provided. These points should be oiled weekly, using medium oil in warm weather, light oil in cold weather and light oil mixed with an equal amount of kerosene in extremely cold weather.

## Lubrication—Its Relation to Engine Wear

LUBRICATION and its relation to engine wear is interestingly treated of in a pamphlet recently brought out by the Vacuum Oil Co., New York City. In its analysis the company purports to show that engine wear is entirely based on the following fallacious assumptions, namely:

1—That wear takes place at substantially the same rate in all makes and types of engines under all conditions of service.

2—That from the time the engine is new, wear is uniformly progressive in proportion to the mileage of the vehicle.

3—That piston clearances and piston ring fits alone determine the choice of the proper oil.

4—That the use of a heavy-bodied oil in engines that have worn excessively will overcome oil pumping.

In the discussion of No. 1 the company claims that this assumption neglects entirely the fact that there are wide variations in the materials used for cylinders, pistons and piston rings in different makes of trucks; difference in design and proportions; differences in manufacturing processes. It also assumes that all owners will accord their trucks the same care.

The claim is that made that variations in any of the above factors will largely affect the rate with which wear will take place, and consequently will make the mileage basis for determining the proper lubricant very inaccurate.

It is well known that the rate of wear of aluminum and cast iron pistons varies widely and that the care exercised in seasoning and finishing cylinders and pistons materially affects the life of these parts. Some owners will take no care whatever of their engines and may drive at high speeds. Others will give proper attention to lubrication and drive their trucks with care.

For these reasons, it is claimed, it must be plainly evident that any system attempting to determine the proper lubricant for all trucks on a fixed mileage basis alone must yield results which are wholly inconsistent and not to be relied upon.

In the discussion of assumption No. 2 the company claims that when engines

are turned out by the manufacturer they are run in only to a limited degree. Consequently, when the truck is received by the owner the metallic surfaces are still somewhat rough. Because of this it is necessary for the buyer of the truck to operate his engine at moderate speeds and loads for at least 1000 miles before the rubbing surfaces wear to produce running fits. During this period, however, it is not necessary to use a lighter oil than is correct for the truck when run in. As the parts wear in there is a slight but nevertheless marked increase in the clearances to the running fits required. Once these polished bearing surfaces and running clearances are produced as a result of engine use, very little wear will occur for many thousands of miles thereafter with proper lubrication.

There are three other important factors that should also be considered, according to the company in its discussion of assumption No. 3. The first is the operating temperature. This is influenced by the type of service, cooling system, cylinder dimensions, valve arrangement and by the details of design. Second is the ability of the lubricating system to handle oils of different bodies. The third factor is carbon deposit. Some engines will not burn cleanly oils of heavy body. The result is excessive carbon deposit, which does not form when lighter oils are used. This condition is aggravated when heavier oils are used.

In the discussion of No. 4 the company claims that though heavier-bodied oils are usually consumed more slowly than light-bodied oils, this remains true, regardless of the condition of wear. Hence, if a change is made to a heavier oil in a worn engine this oil will also be consumed in proportionately excessive amounts.

Consequently, when such oils work into the combustion chambers in excessive amounts, they are not completely burned but remain to form large quantities of carbon. Therefore, if the engine design were such that a heavy-bodied oil could not be used when the engine was in good condition, due to excessive carbon deposit, this oil would be still more unsatisfactory when wear permitted it to pass the pistons in excessive amounts.



# The Battle Against Snow



## 11—Snow Drift Prevention Preventive Measures That Save Money

*This Article Outlines the Principal Causes of the Formation of Snow Drifts on Highways and the Best Preventive Measures Used in Different States. The Different Types of Snow Fences Are Shown and Described and Suggestions Are Made as to the Prevention of Drifting by Removing Obstacles Near the Road*

**I**N most departments of human endeavor an ounce of prevention is worth a pound of cure. The struggle to keep our national and state highways cleared of snow is no exception.

It is not possible to prevent the snow from falling upon the highways, because snow sheds similar to those used for railroad lines in the Rockies would be out of the question financially, as regards both original construction and subsequent upkeep.

Therefore it only remains to clear the snow from the highways after it has fallen, and in this work the push or pull plow has its sphere of usefulness.

But it is possible in most cases to prevent the snow from drifting on the highways. That is, it is possible to prevent a depth of snow on the highways greater than the average depth of the snowfall.

It is in this work that the department of agriculture and the highway maintenance departments of many states are planning more far-reaching measures in

the future; measures which will make it unnecessary to employ hand labor, as in the past, for clearing heavy drifts. This will speed up the work of opening the highways after a heavy snowfall. And this in turn will save very large sums of money, not only directly, in the actual work required to clear away the snow, but also indirectly, in saving the money otherwise lost to industry by the tie-up of industrial traffic.

But if the work of drift prevention is to be carried out efficiently, it is essential that a thorough study be made as to where drifts occur and why they occur just in those places.

There is always a directly traceable cause for a snowdrift. Therefore, if the cause is removed, or neutralized by preventive measures, the drift will not occur again.

### Causes of Snow Drifts

Snow drifting will take place wherever the velocity of the wind is checked by an obstruction. The snow is deposited in drifts for the same reason that a sandbar is deposited in a stream where the velocity of the water is reduced, thus allowing the sand or silt which was car-

ried by the swifter moving water to settle to the bottom.

It is noticeable in some states that the north and south roads are more heavily drifted than the east and west roads, while in other states the reverse is the case. This is due to the prevailing direction of the wind.

On a north and south road, where the prevailing wind is from the west, an obstruction on the westerly side of the road is many times more objectionable than one on the east side. For it is almost always an obstruction that causes the drift.

Upon investigation it will often be found that a fence along the road has caused the drift. Rail, board, picket and especially hedge fences are frequent causes of snow drifts on roads. They check the current of air sufficiently to cause drifts to form.

Brush rows along the road will invariably cause drifts to form. Even a few weeds, although innocent looking enough, may check the current of air sufficiently to cause it to deposit its load of snow. Indeed, a row of weeds along the immediate road shoulder may be the source of considerable annoyance by







lock stakes, driven into the ground 15 in., which are 2 ft. 6 in. long and made of 2 in. by 3 in. wood. The frame is held in place in front by additional stakes driven vertically into the ground. These are the same dimensions as the other stakes. There are approximately 75 ft. of lumber in each 10 ft. section of fence. A fair average cost for a fence complete in place approximates 50 cents per foot.

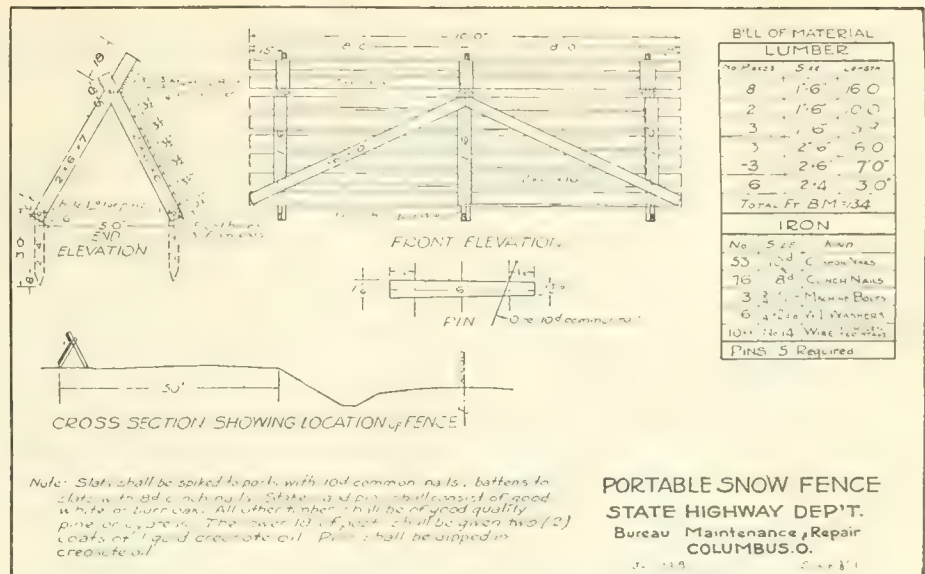
The above is a more or less permanent type. But a portable snow fence may be made with a very similar design. Instead of using stakes to anchor the fence to the ground, a board may be nailed to the bottom of the two legs to hold the fence erect. When this is done, it is necessary to increase the angle of inclination of the fence to the ground, so that the fence will be sufficiently stable not to blow over.

### Picket Type of Snow Fence

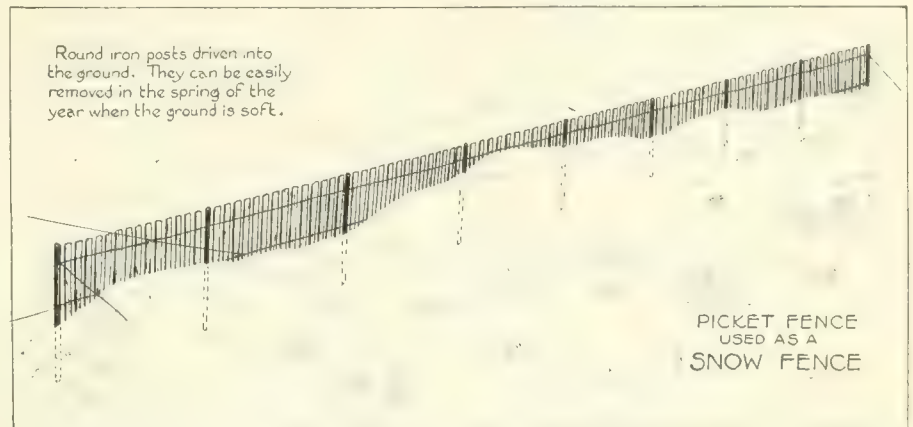
Another type is the picket fence, with pickets placed close together, as illustrated. This is a temporary type. This type is readily removed as it can be detached from its supports and rolled up in sections in the spring, when it can be laid away until the next winter. It may be fastened to posts driven into the ground and 1½ in. hollow iron posts or 1¾ in. by 3/16 in. angle iron, or 3 in. by 4 in. locust posts may be used for this purpose. The posts can be easily pulled out again in the spring of the year when the ground is soft.

The proper location for a snow fence is some distance back from the roadway. This distance, it should be remembered, will vary with the height of the fence. This is the rule: the distance from the edge of the road should be from 8 to 10 ft. per foot of height of fence.

Owing to the expense of constructing a snow fence and of erecting and removing it each year, such preventive measures as removing weeds, bushes, hedges and fences that are too close to the road should be resorted to wherever possible



This is an older type of snow fence as used in Ohio. Quantity and sizes of material required are given

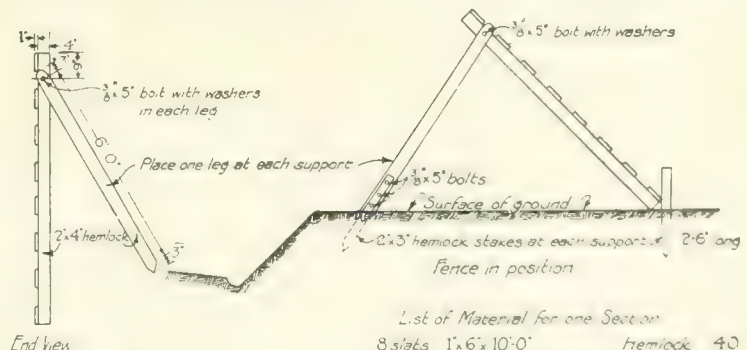
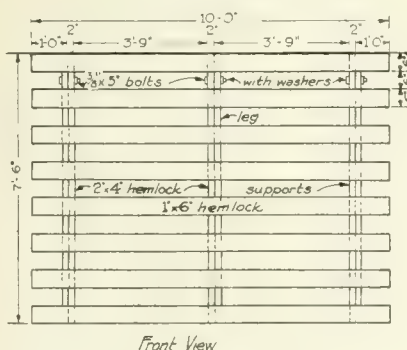


Portable picket snow fence, cheaper than the other type. The picket stakes can be pulled up in the spring

before using a snow fence. It is nevertheless practical and economical to use a snow fence in extreme cases where the

snow drifts badly every year onto important roads and where the drifts are not due to weeds, brush or close fences.

## PENNSYLVANIA STATE HIGHWAY DEPARTMENT



### SNOW FENCE STANDARD

*List of Material for one Section*

8 slats 1'6" x 10'-0"	Hemlock 40 ft BM
3 supports 2'4" x 7'-6"	" 15 "
3 legs 2'4" x 6'-6"	" 13 "
3 stakes 2'3" x 2'-6" (front)	" 3.8 "
3 stakes 2'3" x 2'-6" (rear)	" 3.8 "
12 bolts 1/2" x 5" with washers	Total 75.6 "
1 1/2 lbs 10d wire nails	

The latest type of snow fence in use by the Pennsylvania State Highway Department. The illustration is drawn to scale and the necessary material is listed

# Costs Cut in Half with a Semi-Trailer

**Average Cost Figures Show That Truck and Semi-Trailer Cost More but Reduce Haulage Cost Per Ton-Mile 50 Per Cent**

THERE is no doubt that, where conditions of roads and grades permit and the amount to be hauled is sufficient, trailers and semi-trailers will materially reduce the cost per ton or per ton-mile hauled. That this fact is becoming more generally recognized is shown by the steadily increasing use of these vehicles.

In businesses where stops are many, loads light and quick delivery an essential factor, or where there is not more than, say, 2 tons to be hauled per day, trailers or semi-trailers cannot be expected to show their greatest efficiency. But in most cases the amount hauled by any one vehicle depends not upon the tonnage ready to leave the shipping room but upon the capacity of that vehicle, and in these cases trailers and semi-trailers increase the capacity of the vehicle without increasing the cost of operation to a proportional extent. It is in these cases that trailers and semi-trailers pay.

Below and on the opposite page are given the comparative operating cost figures for a 2-ton truck used alone and for

a 2-ton tractor in combination with a 6-ton semi-trailer. The figures are laid out on sample sheets of THE COMMERCIAL

## What the System Costs

On this page is shown a filled-in sample sheet of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets, is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

VEHICLE Standard Cost Keeping System for Motor Trucks.

From these figures it will be seen that the cost of operating the truck and semi-

trailer is much higher than the cost of operating the truck alone—\$5,106 per year as compared with \$4,029.50 for the truck alone. This increased cost shows itself in every cost item except the oil, as the cost sheets show. The gasoline consumption is higher with the semi-trailer—\$799.50 instead of \$600. The driver is paid \$1 more per day when operating with the semi-trailer, and so on through the list.

However, when the tonnage hauled is brought into consideration, the economy of the semi-trailer shows itself. For the truck alone delivers a total of only 15,000 ton-miles per year, while with the semi-trailer the total of commercial ton-miles is 45,000. Thus, although the total costs are higher, the cost per ton and per ton-mile is much lower. With the truck alone, the cost per ton-mile is \$.268. With the semi-trailer, the cost per ton-mile is only \$.113.

These figures are not those of any one truck but are made up from data printed by the Commercial Trucking World from the records of a number of vehicles and worked out as average figures for vehicles of the capacities quoted.

The Commercial Vehicle—Truck Cost System			
Year		Month ending Jan. 31, 1920	
Make of truck 2 ton Truck Alone		Gasoline Electric	
MONTHLY COST SUMMARY SHEET U. P. C. BOOK COMPANY, INC. 241-249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline 1875 gals.	@ \$.32	\$ 600.00	
Current — kw-h	@		
Oil — qts.	@ \$1.003 per mile for 15,000 miles	45.00	
Grease — lbs.	@		
Kerosene — gals.	@		
Waste — lbs.	@		
Dist. Water — gals.	@		
Driver 300 days	@ \$.6	180.00	
Helper — days	@		
Mechanic — hrs.	@		
<b>A-Total Operating Charges</b>		\$ 2445.00	
<b>Maintenance Charges</b>			
Tires 15,000 miles	@ \$.025	\$ 375.00	
Repairs — { @ \$.02 per mile for 15,000 miles }		300.00	
Overhauling, painting, etc.	@ \$1.00 per month	15.00	
Spare vehicle rental	@ \$1.00 per month	15.00	
Garage rental (pro rata)	@ \$1.00 per month	15.00	
<b>B-Total maintenance charges</b>		\$ 831.00	
<b>Fixed Charges</b>			
Insurance, fire — per year		\$ 117.50	
Liability — per year			
Collision — per year			
Interest @ 6% (On Item 1-40)		150.00	
Depreciation on chassis { @ \$.0304 per mile for 15,000 miles }		456.00	
Depreciation on body { @ \$.0304 per mile for 15,000 miles }		456.00	
Depreciation on equipment { @ \$.0304 per mile for 15,000 miles }		456.00	
Depreciation on tires	@	30.00	
Total taxes and licenses			
<b>C-Total fixed charges</b>		\$ 1029.50	

The Commercial Vehicle—Truck Cost System			
Year		Month ending Jan. 31, 1920	
Make of truck 2 ton Truck & Trailer		Gasoline Electric	
MONTHLY COST SUMMARY SHEET U. P. C. BOOK COMPANY, INC. 241-249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline 2498 1/2 gals.	@ \$.32	\$ 799.50	
Current — kw-h	@		
Oil — qts.	@ \$1.003 per mile for 15,000 miles	45.00	
Grease — lbs.	@		
Kerosene — gals.	@		
Waste — lbs.	@		
Dist. Water — gals.	@		
Driver 300 days	@ \$.7	210.00	
Helper — days	@		
Mechanic — hrs.	@		
<b>A-Total Operating Charges</b>		\$ 2944.50	
<b>Maintenance Charges</b>			
Tires 15,000 miles	@ \$.025 (6 wheels)	\$ 600.00	
Repairs — { @ \$.025 per mile for 15,000 miles }		375.00	
Overhauling, painting, etc.	@ \$1.00 per month	15.00	
Spare vehicle rental	@ \$1.00 per month	15.00	
Garage rental (pro rata)	@ \$1.00 per month	15.00	
<b>B-Total maintenance charges</b>		\$ 1167.00	
<b>Fixed Charges</b>			
Insurance, fire — per year		\$ 117.50	
Liability — per year			
Collision — per year			
Interest @ 6% (On Item 1-40)		150.00	
Depreciation on chassis { @ \$.0466 per mile for 15,000 miles }		699.00	
Depreciation on body { @ \$.0466 per mile for 15,000 miles }		699.00	
Depreciation on equipment { @ \$.0466 per mile for 15,000 miles }		699.00	
Depreciation on tires	@	50.00	
Total taxes and licenses			
<b>C-Total fixed charges</b>		\$ 2206.00	

Two left-hand sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks, shown together for convenience of comparison. One shows the different charges on the truck alone. The other shows the charges on the truck and 6-ton trailer



## The Commercial Vehicle—Truck Cost System

Name of Truck AloneCapacity in lbs. 4,000

Chassis No. \_\_\_\_\_

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243-245 WEST 39TH ST. NEW YORK

## Investment

Cost of chassis, less tires

\$ 2,375.00

Cost of body

Cost of equipment

Cost of tires

225.00

1—Total cost, complete

\$ 2,600.00

## Performance Record

2—Days operated

300

3—Days idle

65

4—Days maintained (Item 2 + Item 3)

365

5—Total hours operated

@ 8 hours per day average

2,400

6—Total miles covered

@ 50 miles per day average

15,000

7—Total trips made

@ 5 trips per day average

1,500

8—Total tons ~~per package or stop~~

@ 10 tons per day average

3,000

## Performance Averages

9—Average miles per day maintained (Item 6—Item 4)

41.1

10—Average miles per day operated (Item 6—Item 2)

50

11—Average miles per trip (Item 6—Item 7)

10

12—Average tons ~~per package or stop~~ per trip (Item 8—Item 7)

2

13—Average commercial ton miles, ~~per package or stop~~ per trip (Item 11 x Item 12)

10

## Recapitulation

14—Total expenses for month (Sum of Items A, B and C)

\$ 4029.50

15—Cost per day operated (Item 14—Item 2)

\$ 13.43

16—Cost per day maintained (Item 14—Item 4)

\$ 11.04

17—Cost per mile operated (Item 14—Item 6)

\$ .268

18—Total commercial ton-miles, ~~per package or stop~~ (Item 7 x Item 13)

15,000

19—Cost per commercial ton-mile, ~~per package or stop~~ (Item 14—Item 18)

\$ .268

## The Commercial Vehicle—Truck Cost System

Name of Truck and 6 Ton Semi TrailerCapacity in lbs. 12,000

Chassis No. \_\_\_\_\_

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243-245 WEST 39TH ST. NEW YORK

## Investment

Cost of chassis, less tires

\$ 3,100.00

Cost of body

Cost of equipment

Cost of tires

400.00

1—Total cost, complete

\$ 3,500.00

## Performance Record

2—Days operated

300

3—Days idle

65

4—Days maintained (Item 2 + Item 3)

365

5—Total hours operated

@ 8 hours per day average

2,400

6—Total miles covered

@ 50 miles per day average

15,000

7—Total trips made

@ 5 trips per day average

1,500

8—Total tons ~~per package or stop~~

@ 30 tons per day average

9,000

## Performance Averages

9—Average miles per day maintained (Item 6—Item 4)

41.1

10—Average miles per day operated (Item 6—Item 2)

50

11—Average miles per trip (Item 6—Item 7)

10

12—Average tons ~~per package or stop~~ per trip (Item 8—Item 7)

6

13—Average commercial ton miles, ~~per package or stop~~ per trip (Item 11 x Item 12)

30

## Recapitulation

14—Total expenses for month (Sum of Items A, B and C)

\$ 5206

15—Cost per day operated (Item 14—Item 2)

\$ 17.35

16—Cost per day maintained (Item 14—Item 4)

\$ 14.26

17—Cost per mile operated (Item 14—Item 6)

\$ .347

18—Total commercial ton-miles, ~~per package or stop~~ (Item 7 x Item 13)

45,000

19—Cost per commercial ton-mile, ~~per package or stop~~ (Item 14—Item 18)

\$ .116

In this illustration, the two right-hand sheets are shown together. That on the left gives the recapitulation of the charges on the truck alone. That on the right shows the recapitulation of the charges on the truck and 6-ton trailer. Note the final cost per ton-mile

## Is Your Truck Life Estimate Too Low?

### Investigation Shows Many Trucks Operate 10 Years and Travel 100,000 Miles

IT is the general custom at the present time to estimate the life of the average motor truck at 5 years. In certain cases where trucks have been heavily overloaded or subjected to very severe road conditions, this estimate has even been reduced, while in other cases it has been increased to about 7 years. But the general average is around 5 years and it on this basis that most truck cost depreciation items are estimated.

However, according to a recent investigation carried out by the White Co. among the owners of its trucks that in many cases the 5-year basis is much too low an estimate. In other words, some truck operators using this figure are estimating their costs with too large an item for depreciation.

#### 100,000 to 300,000 Miles

Where the estimate of truck life has been based on mileage the same thing is true. The average yearly run of the truck is about 10,000 miles, so that a 5-year life estimate corresponds with a 50,000-mile life. But the above mentioned investigation showed that 50,000 miles was much too low an estimate for the average truck life.

A recent annual tabulation of letters from owners operating White trucks shows that 533 trucks which are still in service are known to have traveled 100,-

000 miles; 106 other trucks have exceeded 150,000 miles; ninety-four have traveled somewhere between 200,000 and 300,000 miles; while twenty-five have traveled more than 300,000 miles.

Nor are these trucks limited to one or to a few lines of business.

For example: The Dixon Transfer & Storage Co. of San Francisco, states that three of its trucks have traveled 275,000 miles each, one 465,000 miles and another over 500,000 miles. This last truck was bought 7 years ago, at which time it had already traveled 200,000 miles for the Standard Oil Co., and since then it has been in continuous service.

One of a quartet of trucks operating for the Columbus Bread Co. has passed the 300,000-mile mark. A 2-ton supply truck has traveled 313,000 miles for the Humptulips Logging Co. of Aberdeen, Wash. The Fuller Dry Cleaning Co. of Cleveland has one delivery truck that has rounded out 300,000 miles; two more tied at 240,000 miles and another that has completed 150,000 miles.

#### Whole Fleets 100,000 Milers

In many cases entire fleets have traveled more than 100,000 miles. Gimbel Bros. of New York have twenty-five trucks that have passed the 100,000-mile mark. Twenty-two White trucks have traveled more than 100,000 miles for the

Schulze Baking Co. of Chicago, Cincinnati, Kansas City and Omaha. Every unit in the original fleet of the Bradford Baking Co. of Los Angeles has gone 100,000 miles. The White Transit Co. of Plymouth, Pa., serves the mining region in the vicinity of Wilkes-Barre with a fleet of trucks, thirteen of which have traveled 100,000 miles, while nine are well on their way toward 300,000 miles.

In the same way 100,000 miles is only a nominal mileage for buses. That mark has been passed by fifteen Whites owned by the Emerick Motor Bus Line Co. of Bellefonte, Pa.; by ten Whites of the Twin City Motor Bus Co. of Chehalis, Wash.; by five of the Highway Transit Co.'s trucks at Canton, Ohio; by five of the Madera-Fresno stages at Madera, Cal., and others.

#### Still Good After 10 Years

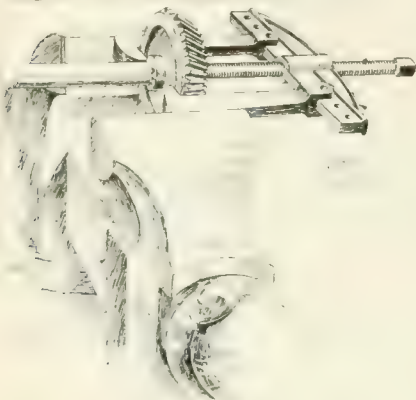
Although less reliable, perhaps, the yearly basis may also be taken in estimating truck life. But the results of the White Co.'s investigation show much the same large extension of truck life on this basis also. A 10-year old White truck is still giving good service after 125,000 miles traveled for the Zanesville Fruit Co., Zanesville, Ohio. W. P. Southworth, Cleveland grocer, still operates two trucks purchased in 1911; and many similar instances can be given.

# The Better Way

## To Save Time in Truck Repair and Maintenance

### No. 376—Vise Used to Remove Small Gears

IN common shop practice small gears are usually removed with the aid of an ordinary small gear puller similar to that shown in the accompanying illustration. However, when this tool is used by itself, the jaws or hooks of the gear



No. 376—Use Vise

puller sometimes develop a tendency to slip out and off the sides of the gears, especially if the latter is bevelled and if the hooks on the gear puller have become slightly worn or bent. This difficulty may be avoided, however, by placing the gear assembly together with the gear puller between the jaws of the vise. The vise may then be closed sufficiently tightly to hold the jaws in place but not tight enough to injure the gear teeth. When this is done the gear may then be removed in the ordinary way and this

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

method will prove much easier than the attempt to pull the gear with the gear puller alone.—W. M. ORGAN, JR., Liberty, Tenn.

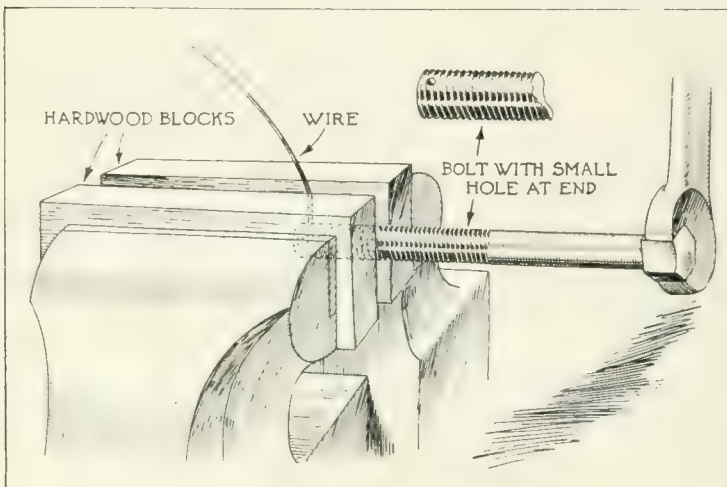
### No. 377—How to Wind a Small Spring

A VERY good method of winding a small spring is indicated in the ac-

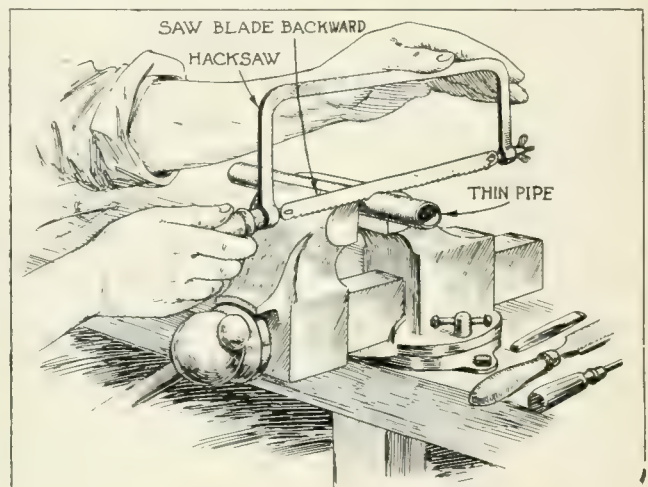
companying illustration. The winding is accomplished by the use of a threaded bolt about an inch longer than the length of the spring required. When a bolt of this type has been selected, drill a small hole through the end of it. The end of the wire which is to form the spring is then inserted in the hole in the end of the bolt. The next step is to place two hardwood blocks in the vise and place the bolt between them, so that the wire which is inserted in the bolt hole will project upward between the two hardwood blocks. Close the vise until the bolt is held firmly between the hardwood blocks. The operation should be started with the bolt projecting about one inch past the ends of the blocks. To wind the spring it is now only necessary to turn the bolt by means of a wrench. The wire will follow in the threads of the bolt and will make a perfect spring of the size desired. A spring of this kind will often prove useful for the siren plunger or other small part which tends to stick.—M. S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

### No. 378—For Better Hacksaw Blade Service

WHEN a hacksaw blade is to be used to cut thin pipe or section of sheet metal in the manner shown in the accompanying illustration, hacksaw blades are very apt to get broken unless a great deal of care is used in the operation. However, this cutting may be accomplished with considerably less hazard to the hacksaw blade if the latter is turned around in the hacksaw before an attempt is made to cut the metal. In shops

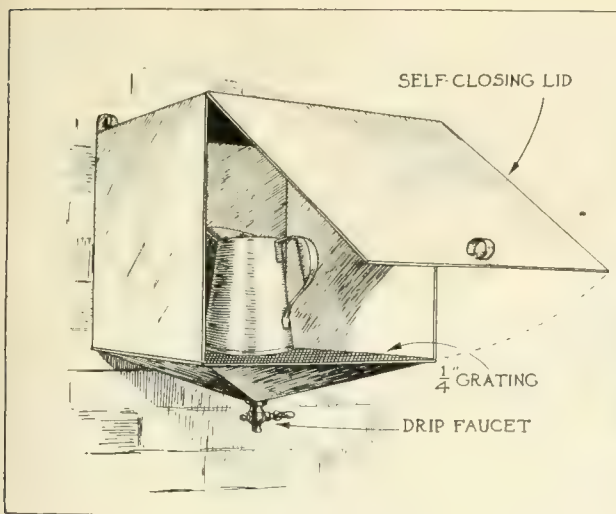


No. 377—Winding Spring



No. 378—Reverse Blade





No. 379—Drip Stand

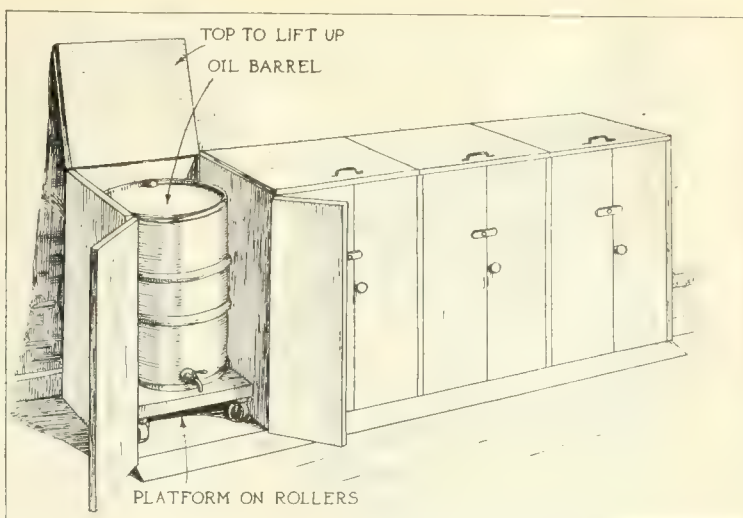
where a great deal of work of this type is required during the year this method will prove a considerable ultimate financial saving.—M. S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

### No. 379—Drip Stand for Small Oil Measures

**E**VEN when oil is kept in large tanks with devices to catch the drip and return it to the tank there is a certain amount of wastage, because the small oil measures used in filling up with oil usually have oil running down the sides of them. This will not waste much oil in a single instance, but where these measures are constantly being used the amount of wastage will prove surprisingly large. This not only means unnecessary expense in the wastage of oil, but it means dirty, greasy conditions wherever the men are in the habit of setting down the oil measures after they have finished with them. The accompanying illustration indicates a good method of avoiding this state of affairs. The device consists of a good-sized tin box, one side of which has a self-closing lid, as shown. The bottom is equipped with a  $\frac{1}{4}$  in. grating and the lower part of the box slopes to a point in the center to serve as a sump. The bottom of the sump has a drip faucet. If the men are instructed always to replace the measures in this box when they have finished with them, much oil will be saved even in a single day, as opening the drip faucet at the bottom of the sump will readily show. Moreover, this will save dirt and grease on the floor which in turn will save the truck tires.—ADAM HERR, Gobel Garage, Brooklyn, N. Y.

### No. 380—Garage Stand for Grease and Other Barrels

**T**HE accompanying illustration shows a stand for barrels as used in the garage of the Adolph Gobel Co. in Brooklyn. The advantages of the stand are as follows: In the first place, barrels standing about in the garage are unsightly and untidy, but if kept in this



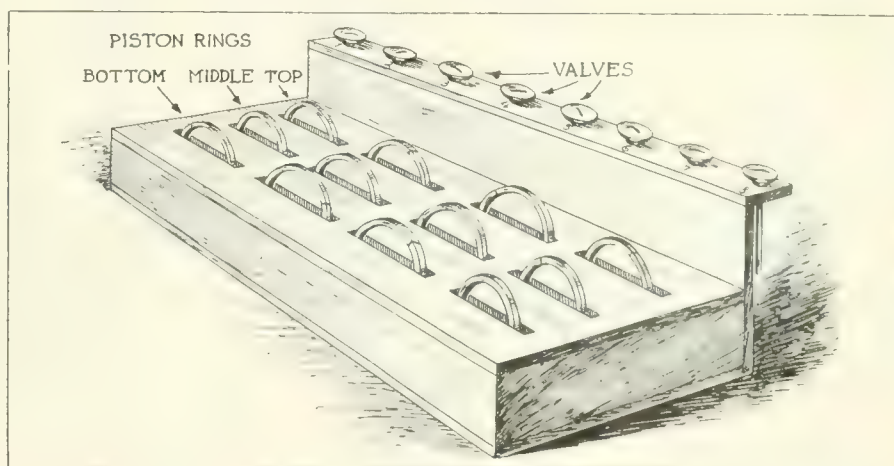
No. 380—Stand for Barrels

stand they are out of the way and always in their places, while the stand itself is painted a suitable color and adds to, rather than detracts from, the appearance of the garage. At the same time the heads of grease and soap barrels are usually removed and if these are kept in a stand similar to the one shown and the lids are kept closed, dirt and small articles are prevented from getting into the contents of the barrels. The barrels stand on small platforms equipped with rollers so that they can be readily pushed in or pulled out of their compartments, and doors are provided in the front of each compartment for this purpose. When the barrels are in place, however, these front doors are kept closed and only the lids used when the men wish to get at the contents of the barrels. Each compartment can be labelled on the outside according to the contents of the barrel which it contains, for example, grease, soap, kerosene, etc.—ADAM HERR, Gobel Garage, Brooklyn, N. Y.

### No. 381—Useful Board for Valves and Piston Rings

**T**HE accompanying sketch illustrates a stand for keeping the valves and piston rings of a 4-cylinder engine ac-

cording to the way they belong in the block. With this method the right valve or ring can be located at once and no time wasted looking for it. At the back of the device the small board projecting backwards has eight holes for the eight valves. These holes are numbered and the valves placed in them in their proper order as they are taken out of the engine block. In the stand itself there are three slots for the three piston rings from the piston in cylinder No. 1. These slots are immediately in front of the sockets for valves Nos. 1 and 2, which belong to cylinder No. 1. The top ring goes in the slot at the back, the middle in the middle and the bottom ring in front. The same process is followed in placing the valves and rings for the other three cylinders in the stand. It will be noted that the stand makes it easy to pick out at a glance the valve or piston ring desired. Moreover, the device is so constructed that any valve or ring can be removed from the stand without difficulty with the thumb and finger. As a method of saving time and preventing the replacement of valves and piston rings in the wrong places, the stand should prove very useful in the truck repairshop for bench work.—CHARLES BOEHME, 1725 Madison Street, Brooklyn, N. Y.



No. 381—Keep Parts Handy



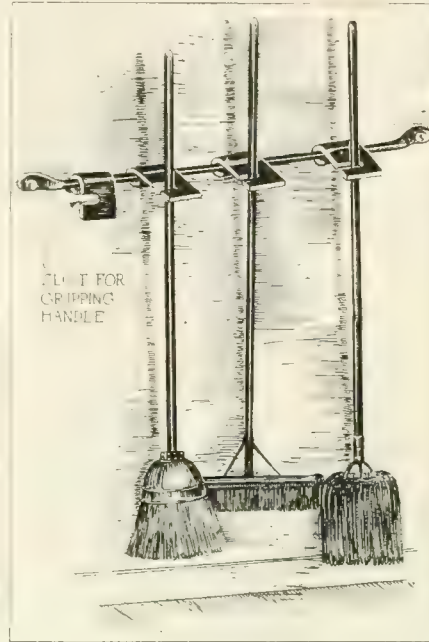
### No. 382—Handy Racks for Cleaning Tools

CLEANLINESS is one of the prime requirements in a well-managed garage, not only because of the fire risk but because of damage done to tires by dirt and oil on the floor and the danger from accidents caused by skidding, etc. But to keep the garage clean a certain number of brooms, squeegees, etc., are necessary and if these are left about in odd corners or lying on the ground as is sometimes the case they defeat the end for which they are intended by themselves making the garage untidy. A place for everything and everything in its place is a good motto for the garage as well as other places. Hence, the device indicated in the accompanying illustration. The device is very simple consisting of a long rod bent at either end and screwed to the wall and four or five slotted sections of sheet metal threaded on the rod. The construction of these slotted grips holds the broom or squeegee tight against the wall and well out of the way.—CHARLES H. WILLEY, Concord, N. H.

### No. 383—To Prevent Rattle in Truck Side Racks

HERE is a shortcut which has nothing to do with actual repairing in the shop but which will tend to increase the general smartness of trucks equipped with adjustable side racks and may even prevent the loss of these racks. The device consists of the use of heavy auto hood fasteners, not only to keep the racks

in place, but to prevent them from rattling when the truck is passing over irregularities in the road. The illustration indicates the method of employing the fasteners. They must be put on upside down so that they will not be liable to be broken off when the truck is being



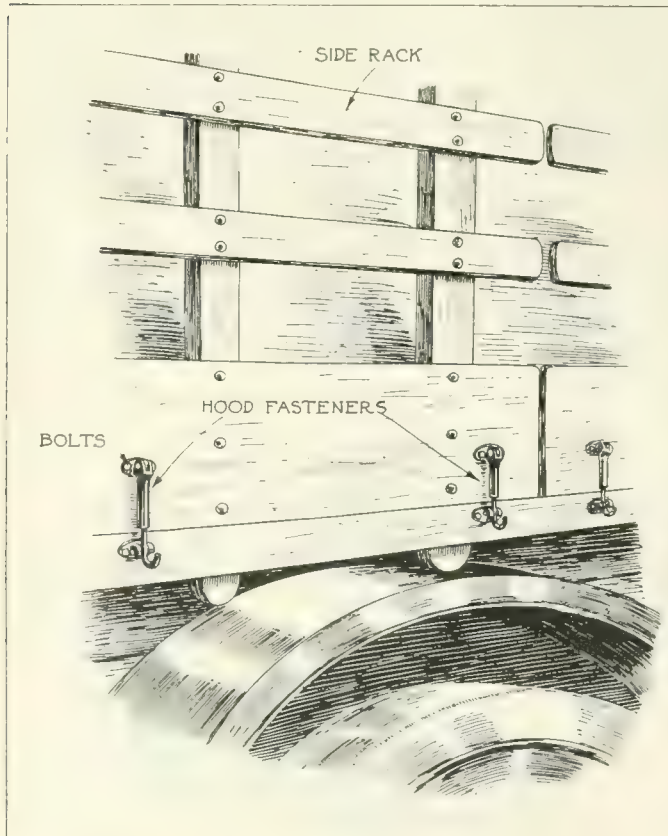
No. 382—Broom Rack

unloaded. Small bolts instead of screws should be used to attach the fasteners to the racks. The upper ends (in this case, the lower ends) of the fasteners then fit into sockets on the outside of the floor

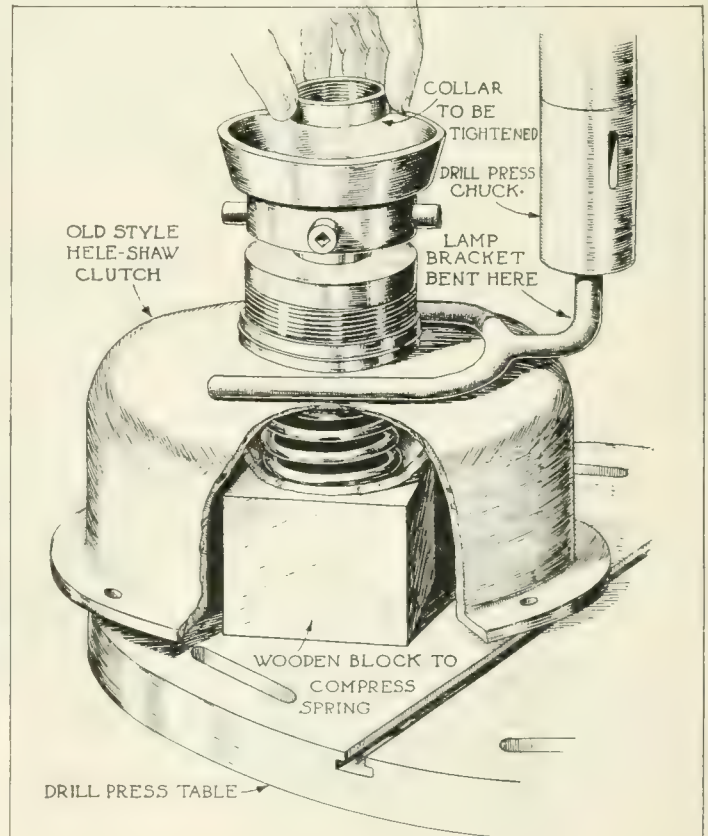
of the body as the illustration shows. The fasteners will hold the side racks firmly in place and will prevent wear on these if they are of wood. They will also be a safeguard against the side racks falling out and getting lost if the truck passes over a severe bump in the road.—ALBERT F. REMY, The Albert F. Remy Co., Mansfield, O.

### No. 384—To Adjust Collar on Hele-Shaw Clutch

A LAMP bracket of the double-end type with the flat end cut off and the round end bent up at right angles will make a handy fixture for screwing on the collar on the tube for the clutch spring in the old-style Hele-Shaw clutch. The lamp bracket is held in position by means of the drill chuck in the drill press spindle. A block of wood is placed on the drill press table and the clutch housing with the tube and spring is placed on top of the wooden block. By means of the drill press handle the lamp bracket is then forced down onto the clutch housing until the spring is sufficiently compressed to attach the collar to the clutch tube. The handle lever of the drill press is placed in the locked or feed position. The operator can then use both hands to attach the collar to the tube of the clutch. This simplifies the work as the shape of the lamp bracket gives the workman a full view of the upper end of the clutch tube to which the pressed plate is attached. In this way the job can be accomplished both quickly and with safety.—GEORGE HERON, The Boston Store, Chicago.

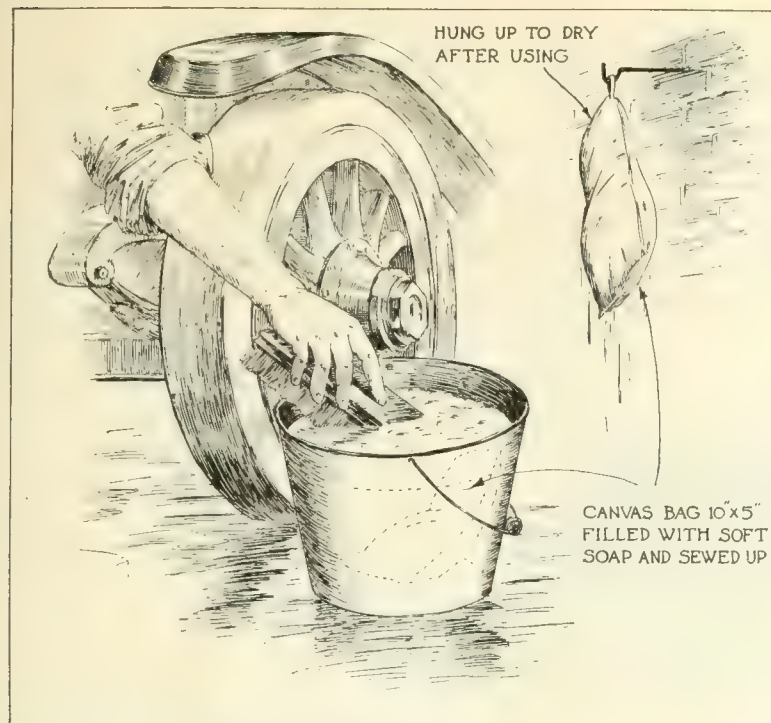


No. 383—Prevents Rattle



No. 384—To Adjust Collar





No. 385—Will Save Soap

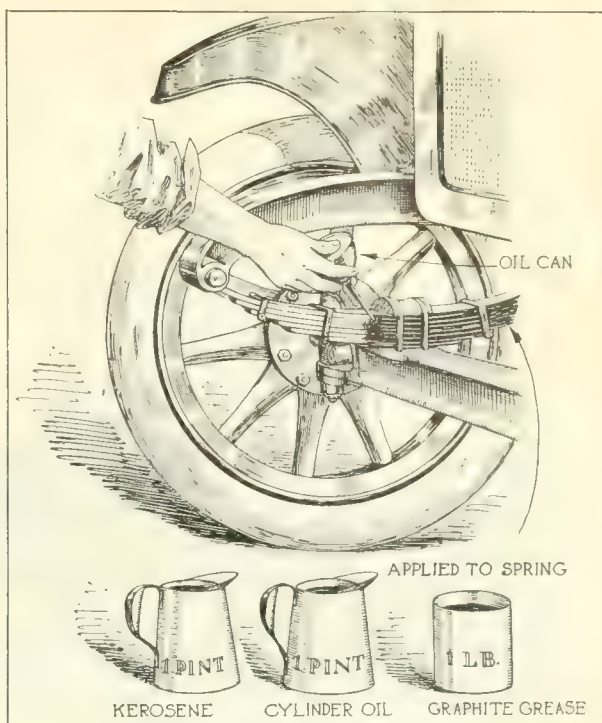
### No. 385—Cutting Down the Soap Bill

THE soft soap used for washing down truck bodies and paint work is not an expensive article and the amount used by the drivers in washing their vehicles, or by the night man in charge of this work, is seldom taken into consideration by those in authority. However, although the soap is not expensive in itself, if it is wasted to any considerable extent by the washers this waste may prove a considerable item in a year's time. The accompanying illustration shows a method of using soft soap which will not only prevent this waste, but will prove a convenience and a time saver in washing down trucks. The device consists of a canvas bag about 10 in. by 5 in. filled with soft soap and sewed up all around like a pillow. When it is desired to wash a truck the bag is dropped into the bucket and left there until the washing is completed. It is then hung up on a convenient nail to dry. In washing the fleet of fourteen trucks operated by Dives, Pomeroy & Stewart, this method has accomplished a saving of from 50 to 60 per cent on the soap bill.—ELMER D. STRUNK, Dives, Pomeroy & Stewart, Reading, Pa.

### No. 386—Carries Grease to the Springs

IN the care of a truck the average driver who is conscientious in looking after his vehicle will see to it that the engine gets plenty of oil and that the various grease cups are turned down or refilled at sufficiently frequent intervals. But as a rule the driver is apt to take it more or less for granted that the springs on his truck will take care of themselves, aside from the grease cups

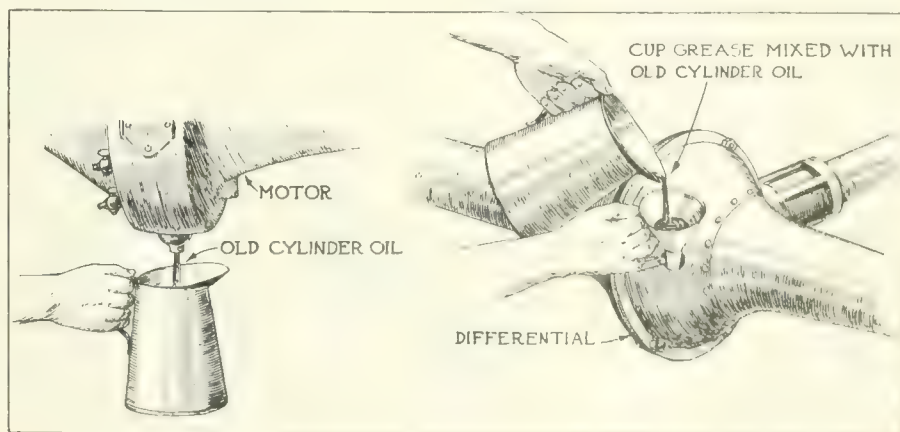
on the hangers. Spring leaves, however, require consideration and proper treatment as much as any other part of the truck although they do not require it so frequently. And the accompanying illustration indicates a method of preventing spring leaf rust and squeaks which may well be called to the attention of the drivers. Take 1 pt. of kerosene, 1 pt. of medium weight cylinder oil and  $\frac{1}{2}$  lb. of graphite grease. Shake these three together well in a closed can or jar and apply them to the spring leaves with an ordinary oil can. The kerosene will carry the cylinder oil and graphite between the leaves and spread them over their surfaces more efficiently than the old-fashioned spreader. When this mixture is applied to one side of a Ford spring it will pass through to the other side in less than a minute. On heavy trucks it will take about 20 minutes. The accompanying illustration indicates the method of applying the mixture.—C. J. NORRIS, C. A. Cross & Co., Inc., Fitchburg, Mass.



No. 386—Prevent Spring Rust

### No. 387—A New Use for Old Crankcase Oil

THE method of using old cylinder oil suggested in the accompanying illustration will not only mean a big saving in oil which otherwise is often wasted, but will prove a positive advantage to the differential and gearset parts, to which it is applied. When the drivers drain their crankcases of oil, as shown in the accompanying illustration, instead of throwing this away, it can be utilized by mixing it with cup grease to any consistency suitable for weather conditions. It can be used for the lubrication of gearsets and differentials. The carbon in the oil will be of benefit to the gears and revolving parts, as the carbon fills up the cores of the metal. After this mixture had been used in this way for some time, a careful inspection repeated at intervals showed the gears and other revolving parts to be in excellent condition.—WILLIAM KINDERMAN, Harrisburg, Pa.

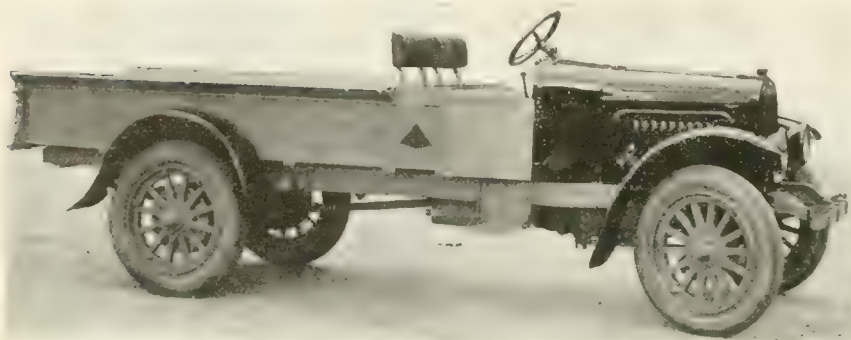


No. 387—Use for Old Oil



# Three-point Mounting of Chassis a Feature of New 3/4-Ton Service Truck

*Transverse Front Spring with Pivot Joint Connection to Frame Renders Truck Suitable for Rough Roads. Rigid Frame Designed to Prevent Weaving of Bodies.*



*The new 3/4-ton Service truck*

A NEW light truck having a capacity of  $\frac{3}{4}$  to 1 ton, which has been designed in compliance with public demand, has just been announced by the Service Motor Truck Co. The chassis will sell for \$1,840, and although the cost is slightly more than many jobs of the same capacity on the market at the present time, the officials of the company claim that this difference is due to their endeavors to build a quality truck that will have a low maintenance cost and long life.

This truck, which has a wheelbase of 132 in. and weighs 3100 lb., is an assembled job of well known units. The unit powerplant comprises a Midwest engine,  $3\frac{1}{2}$  in. by 5 in. bore and stroke developing 40 hp. at 1800 r.p.m.; a Brown-Lipe dry plate clutch and a Brown-Lipe transmission. Power is transmitted through a metal universal joint, a tubular propeller shaft and a fabric universal joint to an Eaton bevel gear drive axle.

During the experimental stage this truck was driven 1200 miles and put to many severe tests. The results obtained were highly satisfactory. The famous Uniontown Hill in Pennsylvania was climbed in second gear at the rate of 15 m.p.h. and the engine was relatively cool when it reached the top. During this trip the truck was driven at its maximum speed a great share of the time and in many instances was driven at the rate of 45 m.p.h. for 15 and 20 mile stretches.

The engine is one of the new products of the Midwest Engine Co., having many of the same features of construction

employed by the larger type. The four cylinders are cast in block and are integral with upper half of the crankcase. The lower half is of pressed steel. Alloy steel valves, 1-17/32 in. at the throat, are used and the valve lift is 11/32 in. The rocker-arm construction is identical with that of the larger type Midwest engine and the push rods are surrounded by breather tubes which will give oil vapor flow constantly over the rocker-arm. This feature aids in keeping out dirt as the engine breathes only internally. A valve lifter platform is bolted to the upper half of the crankcase. Cast iron pistons are used which are provided with grooves to accommodate three rings located above the piston boss.

The connecting rods are of the usual I section and are belled out at the crank-

shaft end, the flange being carried to the center of the bearing. This type of construction will prevent forcing the bearing out of round when the connecting rod is drawn up tight. This engine differs from the larger Midwest engines in its crankshaft construction, as it has a two-bearing counterbalanced crankshaft. The counter weights are belted to the shaft with nickel steel bolts riveted over, and dowel bushings are used where the counter weights come in contact with the shaft. The front crankshaft bearing is  $2\frac{1}{2}$  in. by  $2\frac{3}{4}$  in., and the rear crankshaft bearing is  $2\frac{1}{2}$  in. by  $3\frac{5}{16}$  in.

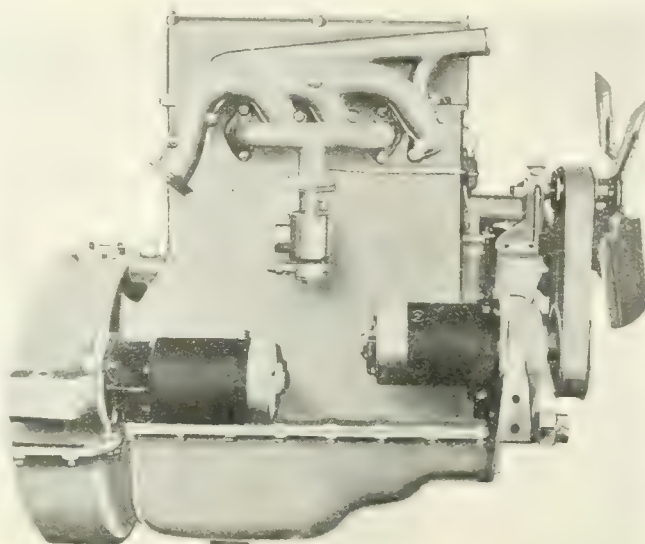
Full forced feed lubrication is provided, the oil pump being a geared pump of the self-priming type. An automatically controlled plunger operated by the vacuum in the manifold regulates the flow of oil in relation to the actual load on the engine and is not dependent on the speed of the engine. This allows ample lubrication for a full load and prevents excess oiling at light or medium loads.

Forced cooling is used and the air is drawn through a radiator having a continuous fin and the tube type core by an 18-in. fan driven by a 2-in. flat belt.

The electrical system comprises the Remy battery ignition and Remy starting and lighting units. The storage battery is the Exide truck type.

Carburetion is provided by a Stromberg carburetor with a hot air stove attachment located on the instrument board. Gasoline is carried in a tank of 12-gal. capacity located in the cowl.

The clutch is a Brown-Lipe

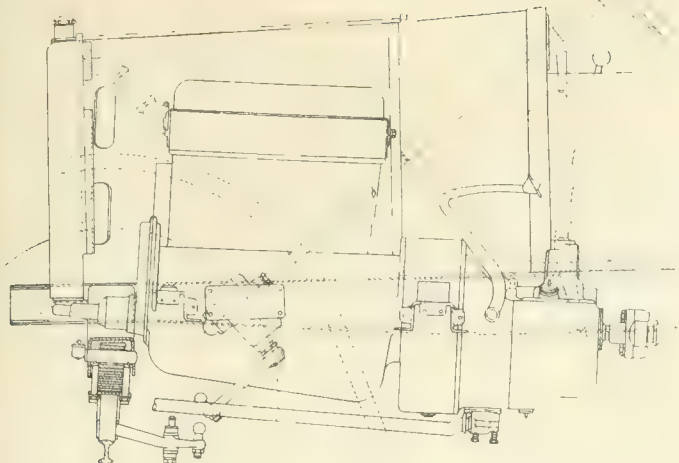


*The engine is one of the new products of the Midwest Engine Co.*

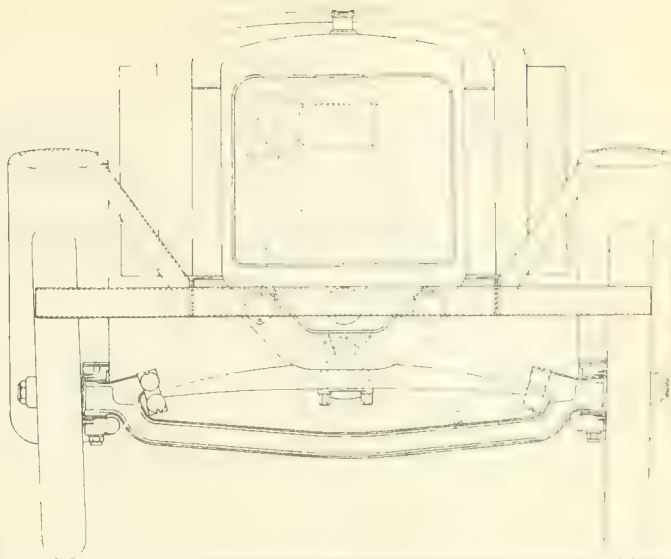
## Service Specifications

Capacity, tons.....	$\frac{3}{4}$
Price .....	\$1,840
Wheelbase, in.....	132
Tires, front.....	31 x $4\frac{1}{2}$
Tires, rear.....	35 x 5
Bore, in.....	$3\frac{1}{2}$
Stroke, in.....	5
N. A. C. C. hp.....	21.08
Final drive.....	Bevel





*Elevation of forward part of Service truck chassis, showing trunnion support of frame and location of radius rods*



*Front elevation of chassis, showing front cross spring pivoted at both ends of the front axle and trunnioned at the center*

single plate clutch, but is provided with a means of adjustment somewhat different from their standard clutches. Adjustment is accomplished by turning a malleable nut which moves several steel pegs in and out, and they in turn change the relative position of the toggle levers and regulate the amount of pressure on the pressure plate. Clutch facings are Raybestos molded 10 in. in diameter and  $\frac{1}{8}$  in. thick. Straight thrust bearing is used instead of the usual radial type. There is nothing unusual about the transmission, it being a Brown-Lipe standard 30, provided with the speedometer drive at the rear.

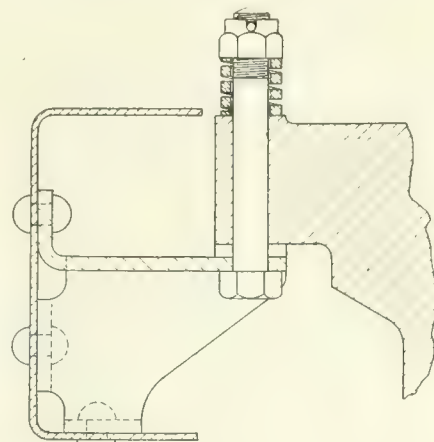
A metal universal joint is used at the front and a fabric joint at the rear. The object in using the fabric joint is to absorb shocks that occur as a result of a constant acceleration and deceleration of the rear wheels and also strains that might come from the engine, clutch and transmission.

The front axle is of the reverse Elliott type, drop forged I beam section of alloyed steel, heat treated. This axle is very light because it has very little load to carry with the front spring construction. The rear axle is bevel gear drive of semi-floating construction, with the wheel fastened solidly to the drive shaft. The axle housing is made of pressed steel with square sections at the spring seat locations to accommodate adjustable spring seats. It is designed for a Hotchkiss drive, but may be equipped with radius rods if desired. The optional gear ratios are  $5\frac{1}{2}$ , 5% and 6-1/7 to 1.

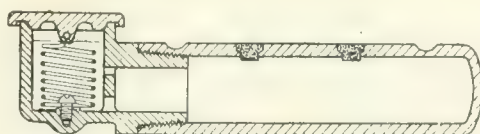
Provision is made for adjusting driving gear axially by means of adjusting nuts on the differential bearings. These nuts are locked by a device which is retained in place by the back cover of the housing, and as the cover cannot be replaced until the bearing locks are in position, all danger of assembling without locking is eliminated. The carrier is in two parts, one serving as a support for the differential and differential bearings, the other parts supporting the pin-

ion and pinion bearings. This construction is of value because of accessibility and permits removing the pinion by simply taking out a few bolts. Cam actuated brakes are used, both brakes being placed inside of the drums to avoid interference with skid chains.

The frame is a pressed steel channel section  $5\frac{7}{8}$  in. deep, is made from  $\frac{1}{8}$ -in.



*Flexible rear engine support on new Service truck*



*Section of shackle bolts and oil reservoir*

stock and is of very rigid construction. It is suspended at three points and is claimed to be rigid enough to prevent rocking of the body, seat, hood and cab doors.

Springs are semi-elliptic both front and rear. The cross front spring construction, however, is one of the important features of this truck. This spring is pivoted at both ends of the front axle

and is trunnioned at the center. A double shackling is provided at either end with the use of  $1\frac{1}{4}$ -in. shackle bolts. A shackle bolt construction used by this company makes the lubrication simple and accessible.

The shackle bolt is drawn from low carbon steel and threaded to a die cast oil cup. Two pieces of felt are used as a means of transferring the oil which is contained in the reservoir of the shackle bolt to the bearing surfaces. The use of a cross spring makes it necessary to provide radius rods which are bolted to the bottom of the transmission housing and taper fitted in the front axle. This type of spring construction also forces the use of four-point engine suspension. The two rear legs of the engine are bolted to the frame against the tension of two heavy oil springs which insures keeping the engine tight at all times.

The steering gear is of the worm and sector type and is of Service design and manufacture. A small metal stamping covers the joint between the knuckle pin and steering head and aids in excluding dirt. Left-hand drive and center control are provided, the gear shift and emergency brake levers being mounted on the transmission. The spark and throttle are controlled by levers under the steering wheel and the throttle is also under the control of a foot accelerator. The pedal of the accelerator is so designed as to eliminate continual opening and closing of the throttle when the truck is driven over rough roads.

Both internal brakes are placed inside the frame to avoid interference with skid chains.

The equipment will provide Remy electric starting and lighting system, Exide truck battery, non-glare lenses in the electric head lamps, cowl light, tail lamp, electric horn, jack, tire pump, set of tools, oil can, bumper, pressed steel front fender, steps, instrument board, gasoline tank, toe and floor boards, speedometer, extra rim seat, cushion tire repair kit.

# Shop Equipment

*Time and Money Saved  
in Truck Repairs*

## Oro Air Compressor

**A**LL Oro automatic air compressors are designed to supply filtered air to motor vehicle tires. There are eight different compressors in the Oro line of outfits, including both single-stage and two-stage designs of different sizes. Models B-35 and B-36 are suited to take care of the inflation of pneumatic truck tires, the first one furnishing air at 150 lb. pressure and the latter at 250 lb. pressure.

Model B-36 is exactly the same as the Model B-35, except that it is equipped with a larger motor and the automatic pressure switch is set to start the motor when the pressure in the tank falls to 220 lb. and to stop the motor when the air pressure reaches 250 lb. This model is especially recommended for the inflation of giant pneumatic truck tires.

When A. C. circuits are used for these two models, a two or three phase motor will be furnished according to the current available. Single phase can be furnished where required.

Equipment included with this outfit consists of a compressor, tank, motor, belt tightener, automatic pressure switch, gage, relief valve, needle valve with hose connection to take  $\frac{1}{4}$  to  $\frac{5}{8}$  in. hose.

The smaller model leaves the factory with the switch set to start the motor when the pressure in the tank falls to 120 lb. and stop the motor when the pressure reaches 150 lb. The manufacturer is the Au-to Compressor Co., Wilmington, Ohio.

## Pletz Screw Press

**F**OR straightening of shafts, bars, beams, etc., the Utility screw press will find a practical use in truck repair-shops. It is made in two sizes, Nos. 3 and

*Oro Air Compressor  
Pletz Screw Press  
Red-E Lathe Tool Set  
Bonney Wrench Set  
Hercules Wheel Puller  
KeHawke Tire Spreader  
Rockford Drilling Machine  
G T D Ford Repair Set  
Petersen Electric Drill*

3½. The latter uses the same diameter screw but will handle larger work. These presses will also press in or out bushings, press gears, or wheel on or off shafts, and will form and bend metal in many shapes.

The bed is 4 ft. long. It is deep and heavily ribbed, with a hole cored under the screw to permit the work to drop through when pressed out. The screw is made of high grade steel. The steel screw pad fits on the end of the screw and the thrust is taken on a hardened steel and bronze washer which sets in oil. The hand wheel on the end of the

screw is fitted with a handle so that the screw can be quickly returned. By the use of a 4-ft. bar of suitable thickness inserted in the hand wheel, a pressure of from 20 to 25 tons may be obtained. The press is made by Carl Pletz & Sons, Cincinnati, Ohio.

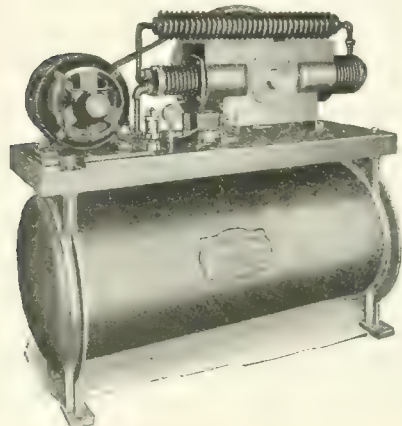
## Red-E Lathe Tool Set

**T**HE Red-E style G set has been designed for a truck shop using one or two lathes. It contains a complete set of tools for all lathe work, a straight and left hand offset turning tool with an offset cutting off and threading tool giving all that is required for outside work. The boring bar and holder with an internal threading bar to be used in the same holder gives a complete equipment for inside turning and threading.

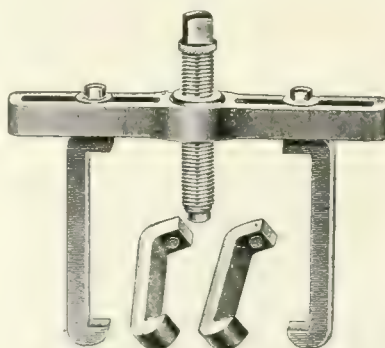
Another feature of the set is that being in one container board which can be kept on the lathe itself, every tool is in place and ready for use. If a tool has been taken out and misplaced it can be seen at a glance. The size of the tool is  $\frac{1}{2}$  by 1 in. The cutters are of high speed steel except the threading tools which are of carbon. The price complete is \$18. The maker is the Ready Tool Co., Bridgeport, Conn.

## Bonney Wrench Set

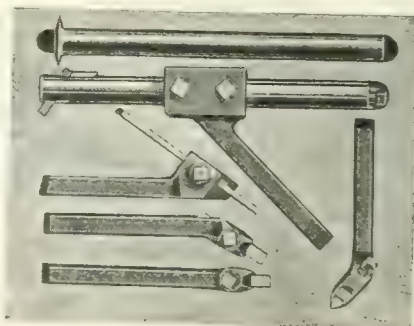
**T**RUCK mechanics will find the Bonney wrench set No. 32 an all-around outfit for repair work. The wrenches have an almost universal application, being designed to cover the most generally used nuts and cap screws from  $\frac{1}{4}$  to  $\frac{7}{8}$  in. in U. S. S., S. A. E. and A. L. A. M. standards. The design of the wrenches in this set is such that the opening is set at an angle of  $22\frac{1}{2}$  deg. from the shank. It is, therefore, possible, by turning the wrench over, to get a swing of 45 deg. The wrenches are packed in one set in a cardboard box at \$3.50 or in a heavy can-



Oro air compressor



Hercules wheel puller



Red-E lathe tool set



Bonney wrench set



vas roll at \$3.75. The maker is the Bonney Vise & Tool Works, Inc., Allentown, Pa.

### Hercules Wheel Puller

**T**WO handy tools for work in truck repairshops are furnished in the Hercules gear and wheel pullers made by the A. Nelson Mfg. Co., Chicago. A feature of both is the means for adjustment, as shown in the accompanying illustrations. A slotted beam is used in connection with the removal of timing gears. This can readily be done with bolts screwed through the beam into the tapped holes in the gear.

The gear puller is furnished complete with four sets of jaws as follows: one set of reversible; one set of 4½-in. narrow; one set of 5½-in. heavy; and one set of 7½-in. heavy. The list price is \$18. The wheel puller is furnished complete with two sets of jaws consisting of one set of 6-in. and one set of 10-in. The price is \$45.

### KeHawke Tire Spreader

**W**ITH the KeHawke revolving tire spreader it is possible to put a reliner in a tire in 10 min., allowing the cement to properly set, because the casing is held rigidly open and because of the rotating feature of this machine. This device has five pairs of claws which grip the tire at points equidistant around its circumference. Turning the hand wheel on the machine opens the interior of the tire for inspection. The price is \$97.50, f.o.b., Minneapolis, Minn. The maker is the KeHawke Mfg. Co.

### Rockford Drilling Machine

**S**EVERAL types of horizontal drilling machines are being produced by the Rockford Drilling Machine Co., Rockford, Ill. The 14-in. size shown in the accompanying illustration is of the plain lever type. This model can also be had in the plain lever type with tapper.

This drill has a column diameter of 4 in., and the cone pulleys have five steps. The 24-in. square table which comes with the drill may be had with an oil groove on request. The table arm is solid in the rear where the greatest strain comes.

There is a large bearing on the arm at the front where it is clamped. A round table, 11 in. in diameter, will be furnished instead of the square, on request.

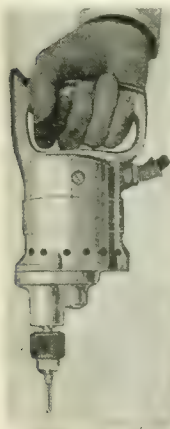
The countershaft has a speed of 600 r.p.m. and has tight and loose pulleys, 6-in. diameter for 2-in. belts. The over-



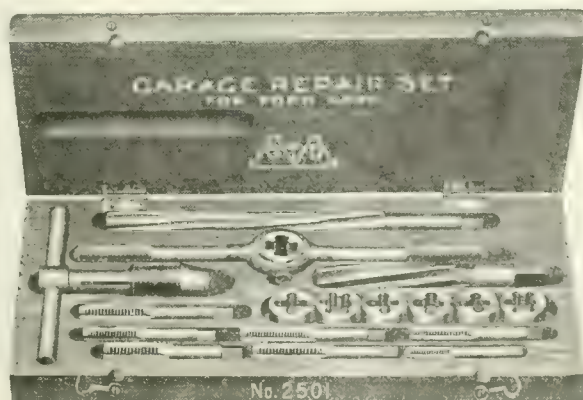
Rockford drilling machine



KeHawke tire spreader



Petersen electric drill



G T D Ford repair set

all height is 67½ in. and the floor space occupied is 19 x 30 in. The regularly constructed feed is controlled by a plain lever. Beveled gears are used to drive the spindle, the hole in the spindle conforming to the No. 2 Morse taper. The swing will drill to the center of 14 in.

A geared tapping attachment can be supplied with any arrangement of feed. It is simply controlled. The reverse gears are disconnected when it is desired to use the machine for drilling.

The price is \$110 f.o.b. Rockford. The tapping attachment is \$50 extra.

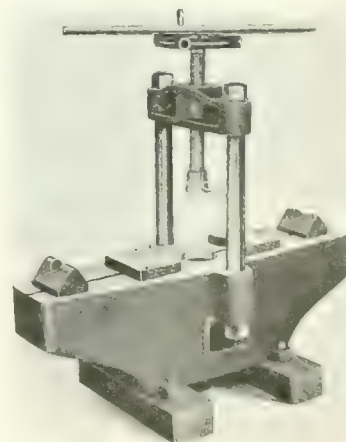
### G T D Ford Repair Tools

**F**LEET owners maintaining Fords will save time during the repair operation by having on hand a set of the G. T. D. tools as they will always be able to find the right size of tap or die to repair any threaded part on the Ford that breaks or gets bruised. The No. 2501 repair set, as illustrated, contains round adjustable split dies, plug taps, adjustable tap wrench, spiral fluted reamers, a 2-in-1 reamer for spindle body and spindle arm bushing, and one reamer for piston pin bushing. The dies are easy cutting, accurate, and adjustable and come in seven sizes. The price is \$17.

Although called a Ford repair set, the No. 2500 set is not confined to this vehicle, as the sizes in this set are universally used on other makes. This set includes sixteen sizes of dies as well as the plug taps, split dies, etc. The price is \$26. The maker is the Greenfield Tap and Die Corp., Greenfield, Mass.

### Petersen Electric Drill

**T**HE latest product of the A. H. Petersen Mfg. Co., Milwaukee, Wis., is a small portable electric drill weighing 3¾ lb. This light weight is made possible by the use of aluminum, of which the entire case and handle are constructed. This tool has a capacity of 3/16 in. in steel and ¼ in. in wood. It has a universal motor, operating on either direct or alternating current. It develops a speed of 1600 r.p.m. and is furnished with either 110 or 220-volt windings. A centrifugal fan keeps the motor cool. The price is \$42.



Pletz screw press

# New Accessories and Parts

*Stewart Warn-O-Meter—Imperial Primer—Accesso Products  
—Lox-On Air Chuck—Reliable Truck Jack—Instant-Pep-Co.  
Piston Ring—Motor Products Windshield—Traction Trac*

## Stewart Warn-O-Meter

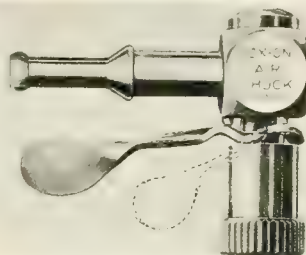
**F**ITTED to the radiator cap or front fender, the Warn-O-Meter is wired back to a thermostat attached to the engine. Concealed in the instrument are two small light bulbs. At normal temperatures a green light shows, but should the cylinders become dangerously hot, the thermostat automatically switches on a red light. The device is difficult to steal because, although a thief might take the indicating unit, it would be valueless without the thermostat. The maker is the Stewart-Warner Speedometer Corp., Chicago.

## Imperial Primer

**T**HE Imperial primer is a plunger pump outfit that throws a rich spray of vaporized fuel into the manifold near the entrance to the cylinders, thus enabling the engine to be started quickly. Connection is made to the dashboard so as to eliminate lifting of the hood. All connections are made by couplings, no soldering, flaring or threading being required, with the exception of drilling and tapping into the manifold for a 1/8-in. iron pipe thread. The price is \$6 and the maker is the Imperial Brass Mfg. Co., Chicago.

## Accesso Products

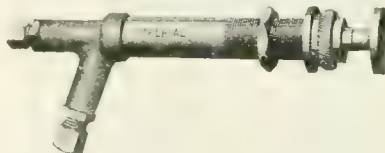
**A** TROUBLE lamp with a magnetic base, so that it can be attached to any steel or iron part of the truck, is one of the new products of the Accesso Mfg. Co., Boston. The other is a license



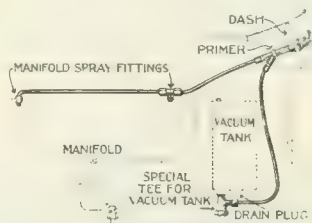
*Lox-On air chuck*



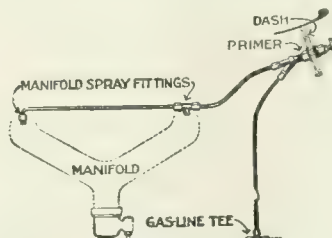
*Stewart Warn-O-Meter*



*The Imperial primer is of the plunger pump type*



*Imperial primer with vacuum tank*



*Imperial primer connections without vacuum tank*

holder that provides a place for all papers pertaining to the truck and the driver.

In the trouble lamp the current from the battery, in addition to lighting the bulb, also magnetizes the base. The complete outfit consists of a magnetic coil, base, lamp socket, 4 cp. bulb, nickel plates, brass tube and hood, cord and plug. The price is \$5.

The license holder is made of either nickel or gun metal finish. The cover is held securely to the base by a patented fastener. The dimensions are 2 1/4 by 3 3/4 by 1/2 in. The price of the license holder is \$1.

## Lox-On Air Chuck

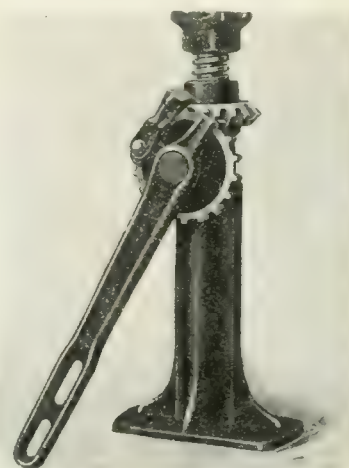
**T**HE Lox-On air chuck slips over the tire valve and then grips it, or releases it by turning the lever. The rubber cylinder does not wear away because it does not have to be pushed or pulled over the valve threads. It is impossible to jam the chuck over the valve shoulder because of the metal baffle plate.

When the lever is not turned on, the rubber cylinder is large enough to fit loosely over the valve. When the lever is turned on, the rubber is pressed in, gripping the valve tightly and preventing any escape of air.

Every Lox-On chuck is made with the universal stem, to fit either 1/4 or 3/8-in. hose. Special stems may be ordered. The price for one is \$3. The maker is the Automatic Safety Tire Valve Corp., New York City.



*Accesso magnetic lamp  
Accesso license holder*



*The Reliable jack for light and medium weight trucks*



### Reliable Truck Jack

THE No. 38 Reliable jack has been designed for use on light and medium weight trucks. All working parts and stand, except the screw, are of malleable iron, carefully annealed. The screw is of cold rolled steel and has a 1¼-in. diameter. The jack will lift 5 tons. When lowered it is 11 in. high. The height extended is 16 in. The maker is the Elite Mfg. Co., Ashland, Ohio.

### Instant-Pep-Co. Piston Ring

THE Instant-Pep-Co. piston ring is a standard step cut ring with oil-sealing and fast-seating features, recently perfected by the Pennsylvania Piston Ring Co., Cleveland, Ohio.

The features in design and construction of this ring are as follows: 1—The processes and methods of casting as well as the machining are such that it will fit as a perfect circle all around the cylinder wall; 2—It will exert uniform pressure all around the cylinder walls; 3—The two angular grooves in the ring insure a perfect lubrication of the cylinder so as to avoid any excessive wear either on the cylinder walls or on the ring itself; 4—The reservoirs of oil which the two angular grooves of the ring hold insure an oil seal all around the ring; 5—By making the two angular grooves in the ring, it is cut into three distinct bearing surfaces with equal and uniform pressure on each bearing surface; 6—In making the two angular grooves in the ring, one-third of the ring's bearing surface is cut away, at the same time giving the ring an adequate proportionate tension; 7—The ring is so constructed that no tools or skids of any kind are required in

mounting the ring on the piston; 8—The rings are made out of individual castings, the inside scale or skin of the casting being very largely preserved in order that the ring will have adequate and effective pressure.

The price per ring ranges from 50 cents to 70 cents, according to the size.

### Motor Products Windshield

A NEW windshield made especially for Ford delivery cars and trucks has been placed on the market by the Motor Products Corp., Detroit. This new product, Model No. 100, is equipped with a slip dash and is constructed of heavy gage steel in order to withstand hard usage. It has the rain vision and ventilating features.

The side arms are of pressed steel with extra deep channel brackets to fit a 3¼-in. dash. The glass is of polished plate with gray ground edges. The upper pivot is of ball lock construction and the lower cone friction. The finish is in black enamel, baked on. A rubber strip set into lower frame makes a weather-proof junction with the filler board.

The slip dash is made of well seasoned wood, finished with one coat of filler and two coats of varnish. This dash will fit any Ford.

The company also makes a windshield for heavy-duty trucks that will fit a dash 42 in. wide and 1 in. thick. This model will fill an opening of 22 in. between the dash and the top of the truck. It is constructed of the same material as the No. 100, and is practically the same in design as that model with the exception of the side arms.

The Ford model costs \$23.50. The slip dash costs \$4.50 extra. The larger model costs \$23.50.

### Traction Trac

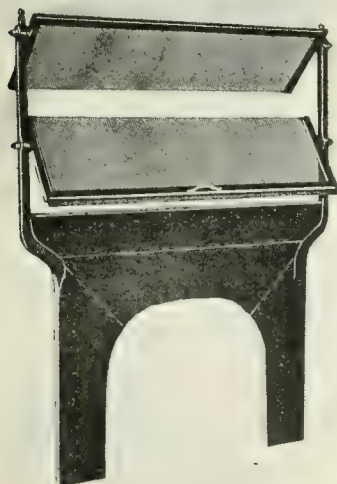
THE Traction Trac has been designed to provide traction to truck wheels that are mired in mud. The device consists of two heavy parallel planks securely fastened to one another by metal braces. Strips of metal are fastened diagonally on the faces of the planks in such a manner as to form a series of V's. These strips, which give traction to the wheel, are thick or deep at the outer ends and thin at the middle. This construction keeps the wheel in the center of the board. The end of the device which is inserted down into the mud hole is tapered and the opposite end has studs or metal projections to allow the looped ends of the ropes furnished with this outfit to be attached.

The maker states that no matter how deep the wheels may be submerged in mud, utilization of this device will provide an effective traction surface that will facilitate the truck's quick extrication on to solid ground.

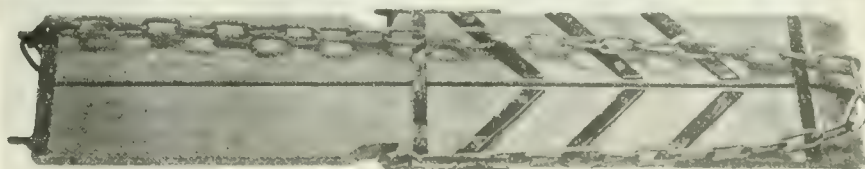
In operation, the board is placed in front of the stuck wheel, the end of the chain is hooked on the inside middle lug of the board, the chain is passed through the spokes of the wheel and drawn tight before hooking on the outside top lug on the board. The truck is then started, putting a strain on the chain which will pull the board under the wheel, thus giving traction by means of the cleats. As the truck climbs out, the studs automatically release the chain from the board, allowing the truck to proceed to dry ground. The device is made in four sizes. The Ford size uses rope instead of chain and sells for \$5 per pair. The heavy duty size for 3-ton trucks or over sells for \$20 per pair. The maker is the Auto Extractor Mfg. Co., Philadelphia.



The Instant-Pep-Co. piston ring



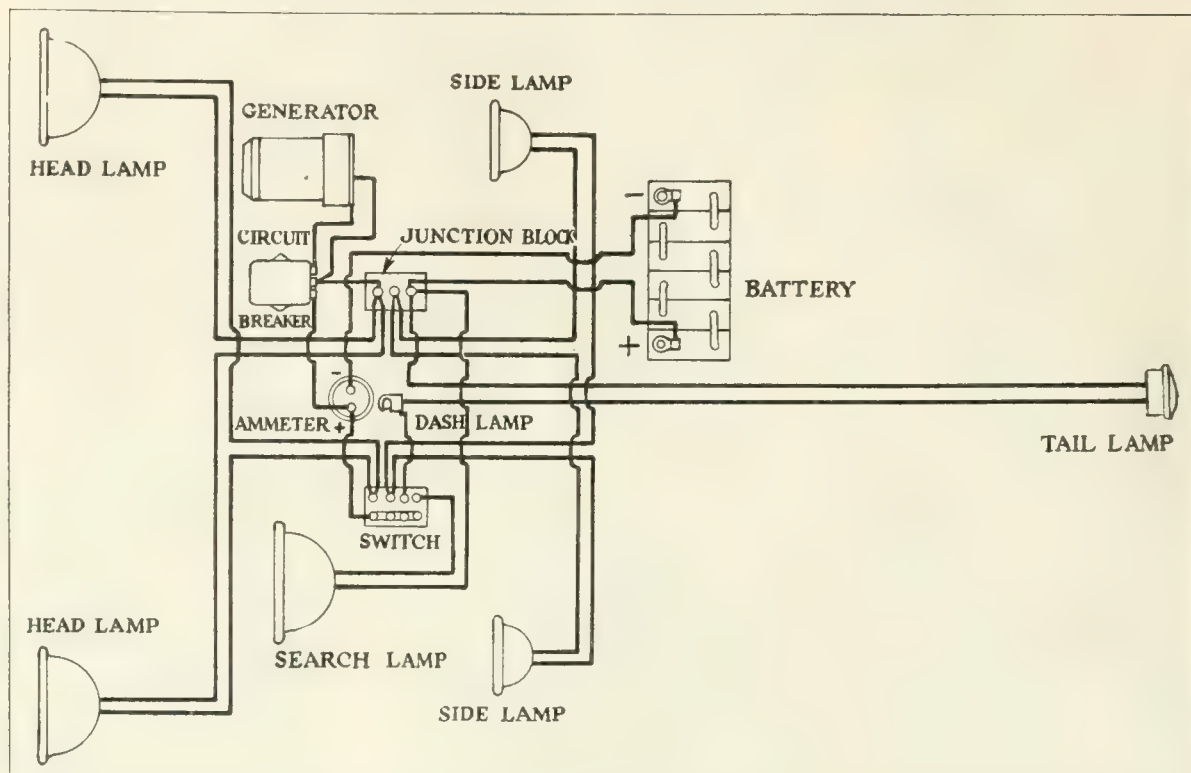
Motor Products windshield for Ford cars and trucks



Upper—The Traction Trac in operation in a mudhole  
Lower—Closeup view of Traction Trac

# Motor Truck Electric System Wiring Diagrams

## 14—Starting and Lighting Unit on Mack Truck



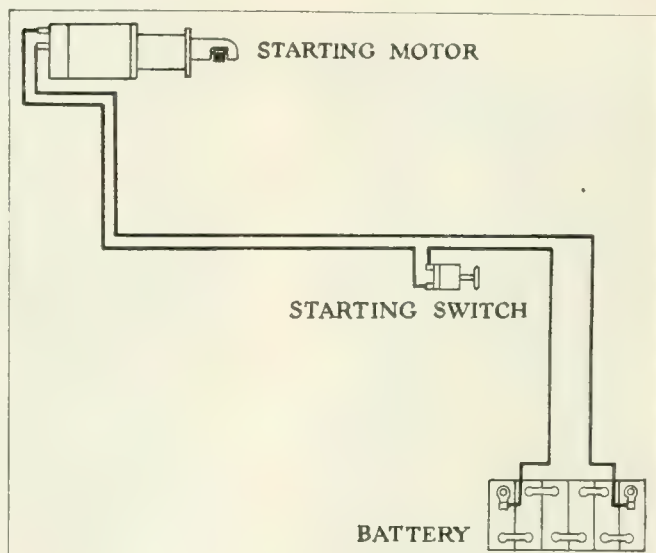
The Mack lighting and starting system is of the two-unit type. A Leece-Neville generator, starting motor and circuit breaker are used. The generator is capable of an output of 12 amp. at 15 volts, but is so regulated by the third brush method that its output is limited to 6 amp. at 12 volts. The battery for lighting and starting is the Exide truck type 6LXRE 5-1, of 66 and 40 amp. hr. capacity, respectively, at 12 volts. Gray & Davis lamp equipment is used. A Harvey-Hubbell flush type 4-gang toggle switch is used to control the light circuits. A Weston ammeter, junction block and instrument lamp are mounted on the instrument board with the lighting switch. The starting motor switch is of the roller contact type, hand operated, and is also mounted on the instrument board. All wiring is of the two-wire or non-grounded type and all connections throughout the system terminate either at the junction block or the lighting switch, by which any necessity of splicing wires is eliminated.

### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE:

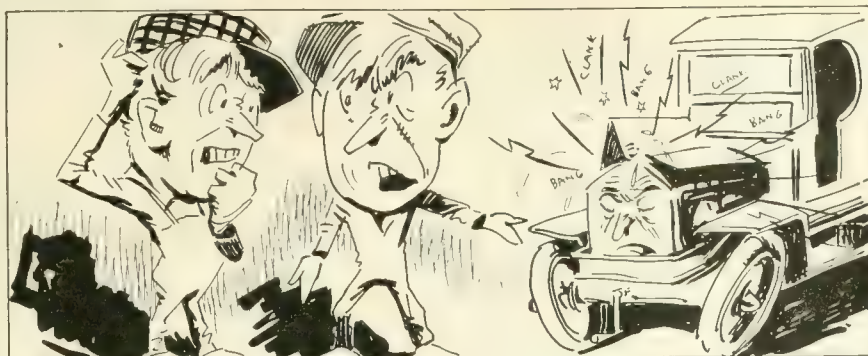
1920		
1—Ford, Starting and Lighting.....	Oct.	1
2—Acme, Lighting.....	Oct.	15
3—Bethlehem, Starting and Lighting.....	Oct.	15
4—Atterbury, Lighting.....	Nov.	1
5—Ace, Starting and Lighting.....	Nov.	1
6—Atlas, Starting and Lighting.....	Nov.	15
7—Briscoe, Starting and Lighting.....	Nov.	15
8—Defiance, Starting and Lighting.....	Dec.	1
9—Commerce, Starting and Lighting.....	Dec.	1
10—Grant, Starting and Lighting.....	Dec.	15
11—Brockway, Starting.....	Dec.	15
1921		
12—Maxwell, Lighting.....	Jan.	15
13—International, Starting and Lighting....	Feb.	1
14—Mack, Starting and Lighting.....	Feb.	15
15—Vim, Starting and Lighting.....	Next Issue	



Wiring layout as used on the starting system of the Mack truck



# Write to The Forum About It!



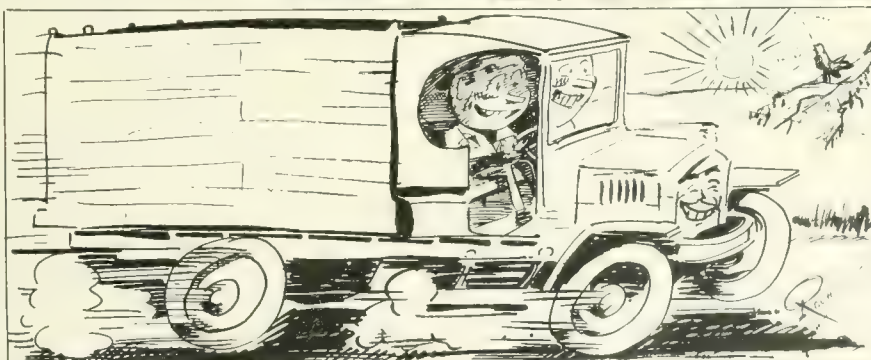
*"I don't know what's wrong. But I tell you, Bill, something's going to happen to that bus—"*



*zzz???!!!!!!?!!?*



*"I'll tell you what! We'll write to The Commercial Vehicle Forum and ask them about it!"*



*"Some idea of mine, about writing to The Forum, eh?" "I'll tell the world it was!"*

## THE COMMERCIAL VEHICLE

239 West 39th Street  
New York City





# The Fleet Owners' Forum

## High Compression Piston May Be Cause of H. H.'s Trouble

To the Editor, COMMERCIAL VEHICLE:

Having read H. H.'s engine trouble, your causes for engine knocks and W. H. B.'s solution No. 1, I believe W. H. B. is on the right track if the motor is a  $4\frac{1}{2}$  by  $5\frac{1}{2}$  and the height he gives for raising the cylinders is about right for this reason, perhaps.

About six months ago we were overhauling an engine and new pistons were required. The new pistons obtained from the service station were about  $\frac{1}{4}$  in. higher than the original pistons, from piston pin hole to the top of the piston.

The writer found out that the engine manufacturer made this type of high and low compression pistons, using the high compression type for speed and the low compression design for heavy duty work. H. H.'s truck may have high compression pistons and the truck may be geared too high for heavy duty. Writing to the engine manufacturer, giving the number, he may be in a position to know if the engine was equipped with high or low compression pistons or if he makes the two kinds of pistons mentioned.—GEORGE HERON, Chicago, Ill.

## Explanation of the Drawbar Pull Principle in Trailer Use

To the Editor, COMMERCIAL VEHICLE:

I would like to know the engineering reason why a  $1\frac{1}{2}$ -ton truck will carry a load of 4 tons on a semi-trailer.—H. TAYLOR, Harrison, N. J.

The reason for this is that the latent drawbar pull of the truck is only brought into action when the vehicle is required to pull rather than to carry a load. Perhaps this principle can best be explained by stating the well known fact that a horse can pull more in a wagon than it can carry on its back. A similar condition is also found in the railway locomotive which pulls a train many times its own weight, and again in the case of the harbor tug which can pull many times its own weight on loaded scows.

In starting a loaded four-wheeled truck, the force required to put the vehicle in motion is directly proportional to that portion of the load concentrated over the rear wheels, other conditions of weight distribution over front and rear wheels and road conditions as to type of pavement and degree of grade being equal.

Under these conditions the power transmitted from the engine to the rear axle is sufficient to start the load by means of the proper gear reduction between the engine and the rear wheels. This gear reduction is generally made low

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

enough to start the truck under full load in low gear under the worst possible conditions met in average running.

When a semi-trailer is employed, the major portion of the load is generally concentrated over the trailing wheels so

## H. H. Started Something

H. H.'s engine problem has created much interest among the readers of THE COMMERCIAL VEHICLE, judging from the number of solutions that have come in. His engine knocks the moment the accelerator is stepped upon. He has not been able to eliminate this knocking, even though he has investigated every one of the most common causes for engine knocks.

Solution No. 2 which appears on this page agrees with No. 1 on the point of over-compression, but gives a different method for reducing the compression.

If you have had similar trouble and have found a solution for it, let us hear from you.

## Will You Help?

that that portion of the load concentrated over the rear trucks wheels is less than is the case in a four-wheeled vehicle used as a truck alone. This reduction in the weight concentrated over the rear wheels does not require the full engine power to start the load, and the difference between the power used under this condition and that required to start the load when carried on the truck itself is converted into drawbar pull to tow the major portion of the load carried on the trailing wheels. As the power required to pull a load is less than that required to carry it, the power required to move the load over the trailer wheels can be obtained from the engine without overloading it.

## Wants Details on How to Start a Truck Service in Illinois

To the Editor, COMMERCIAL VEHICLE:

I am contemplating starting a truck service over a given route in the State of Illinois and should like to have you furnish me with the following information:

1—From whom I can secure a permit or franchise?

2—Cost of such a permit and how this cost is determined, whether by the number and size of the trucks in service or by the estimated tonnage to be handled?—S. M. E. Co., Sycamore, Ill.

1—You can secure a franchise to operate a public motor truck route from the Illinois State Public Utility Commission.

2—There is no expense in this connection except that involved in making the application, filing the schedule of rates and the necessary attendance at the hearing when the application is considered.

According to the Chicago Motor Truck Owners' Association, it is doubtful whether such a franchise will be of any value to you because the Illinois Public Utilities Commission has never seriously attempted to control motor transportation lines due to provisions of the Illinois State law being indefinite on the subject and furthermore because there is a movement on foot to abolish the Public Utilities Commission altogether. Some of the existing Illinois truck lines have appeared and secured certificates of necessity and convenience, as they are called, but in most cases this has been merely a precautionary measure.

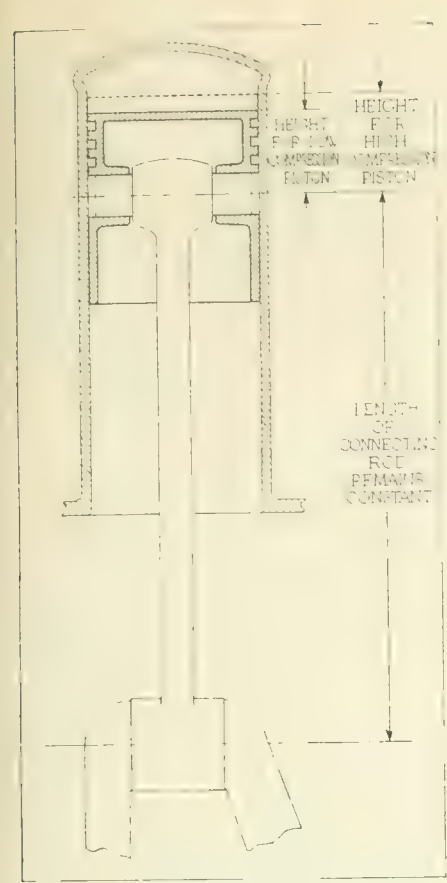
## Wants Derivation and Pronunciation of the Word Chassis

To the Editor, COMMERCIAL VEHICLE:

Is the word chassis pronounced "chassis" or "chas-say"? What is the derivation of the word?—S. G., Bronx, N. Y.

The pronunciation is "chas-say." The derivation is French, meaning a frame in wood or metal; the framework of a wagon. Later the term was applied to the framework of a locomotive; then to the longitudinal and transverse frame members of a motor vehicle. By extension it also designates the whole of the mechanical portion of a motor vehicle. More correctly, however, the word chassis should only apply to the metal framework receiving the engine, gearset and controlling mechanism.





H. H.'s engine may have high-compression pistons, decreasing the compression space as shown above

Valve Timing of Available Engines Marked on Flywheels

To the Editor, COMMERCIAL VEHICLE:  
I am contemplating overhauling the engines in my 2 and 3½-ton Availables and intend tearing them down. It will therefore be necessary for me to re-time the valves. I would appreciate your publishing instructions on how to re-time these valves.—F. S., Detroit.

Unless the engine has been torn down or the camshaft removed there will be no occasion to re-time the valves. The large gear on the camshaft and the small gear on the crankshaft are plainly marked at the teeth which should be in mesh for proper timing.

For purposes of checking, the proper openings of the valves are marked on the rim of the flywheel and inspection may be made after removing the large plate directly on top of the flywheel housing. The markings should appear under the large pointer.

Symbols are used to indicate positions, such as "I. O. 3-4," meaning "inlet opens on cylinders 3 and 4;" or "E. C. 3-4," meaning "exhaust closes on cylinders 3 and 4." The letter "I" stands for inlet, the letter "E" for exhaust, "O" for opens and "C" for closes. "D. C. 1-4" means top dead center for the pistons in cylinders one and four.

In the 2 and 2½-ton trucks the valve timing is as follows: Inlet opens 11°30' past dead center. Inlet closes 44°12' past lower dead center. Exhaust opens 45°48' before lower dead center. Exhaust closes 11°30' past upper dead center.

In the 3½-ton trucks the timing is as follows: Inlet opens 17°53' past upper dead center. Inlet closes 29°25' past lower dead center. Exhaust valve opens 42°36' before lower dead center. Exhaust valve closes 8°20' after upper dead center.

A variation of from ½ to ¾ in. either way is allowable in the positions of valve timing, this means measurement being taken on the rim of the flywheel. In checking the valve timing always turn the engine in the direction it runs. Never turn backward, as the back lash of the gears will destroy the accuracy of the measurements.

Oil Pressure on Master Trucks Is Controlled by a Valve

To the Editor, COMMERCIAL VEHICLE:  
Lubrication on my Master Junior model is taken care of by a combined and positive feed system. I would like to know whether this system is used on the 2- and 3½-ton models. If not, what system is used and how is the oil pressure maintained?—A. EVERETT, Geneva, N. Y.

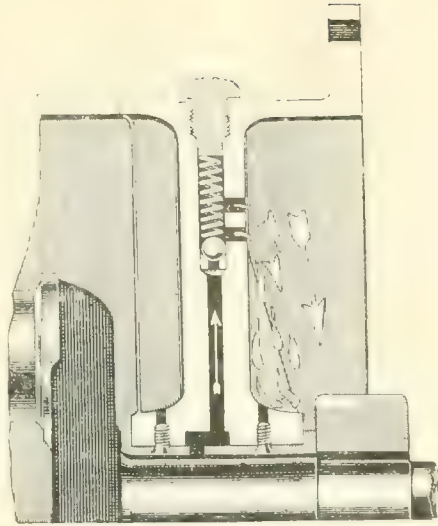
The two larger models use a full pressure oiling system, and as a result require a heavier oil than in the smallest model. In the two larger models a pressure of 30 lb. is maintained at 1000 r.p.m. of the crankshaft and is controlled by a regulating valve in the line. This pressure is set at the factory. The regulating valve is of the ball and spring type and easily adjusted from the outside of the engine.

This oil pressure is regulated by thin washers under the large round-headed screw in front of the first cylinder on the left side, as shown in the accompanying illustration. Removing one or two washers increases the pressure; adding to the washers, decreases it.

Sliding Gears Are Noisy—Reader Wants Advice

To the Editor, COMMERCIAL VEHICLE:  
I have had considerable trouble with noisy operation of my sliding gears. Thinking that the trouble was caused by insufficient oil, I paid particular attention to that detail, only to find that the noise continued. I would like to know just where I can locate my trouble.—G. SMITH, Trenton, N. J.

Your solution is in the installation of new gears. The noisy operation is due to improper meshing of gears which are worn so as to produce a grinding sound. If the bearings are worn or out of adjustment sufficiently so the main and countershaft center lines are not in



The ball and spring type of oil regulating valve used on the Master trucks

alignment, it will be impossible to have correct gear engagement. If the gear teeth have become battered or burred by careless shifting, or if they have worn in service so that considerable looseness exists between the teeth, the lost motion therefrom will cause a lack of smoothness in gear changing.

Reason for Making Interest a Fixed Charge on Investment

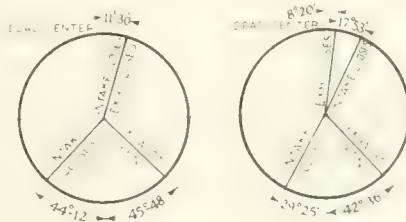
To the Editor, COMMERCIAL VEHICLE:  
I notice in the various cost stories that you list "interest" as a fixed charge against the operation of motor trucks. Please advise why this is done.—L. DAY, New York City.

Interest is a fixed charge in the operation of motor trucks because a motor truck is an investment. When the motor truck is purchased, money is taken from the treasury or from the credit of the purchaser to cover its cost. This is an investment, and all investments should earn interest.

In the business of a concern, such investments are supposed to earn the legal rate—usually 6 per cent in most States. An investment when made is assumed to be permanent, and unless it is liquidated should certainly return its interest, taken for convenience on the simple plan, say 6 per cent and on the original investment every year. Therefore, independent of the amount of work done by the truck invested in, and regardless of all other contingencies, that investment should be charged with a 6 per cent interest each year.

Briefly, there are two methods at present in use by truck owners to calculate the interest on investment. One is the charge of 6 per cent on the original investment every year. The other is to assume a different book value of the truck at the end of each one-year period and to calculate the interest on this varying investment by means of a formula which will give the added interest over each period of the assumed life of the truck.

The first method is, of course, the sim-



Left—Valve timing on the 2 and 2½-ton Available trucks. Right—Valve timing on the 3½-ton Available



plest, because only one operation is necessary, namely, multiplying the initial cost of the truck minus tires by the 6 per cent interest charge. This method of calculating interest, however, while extremely simple, is only justified when no sinking fund or amortization fund is kept. Figuring interest in this manner may best be explained by a simple example. Suppose a truck costs \$5,000 minus the tires and that it is assumed to have an actual or book life of 5 years. Then assume that it depreciates equally each year at the rate of 20 per cent. By the simple method, the interest charge on the investment for the first year is 6 per cent on \$5,000, or \$300. At the end of the first year the truck has depreciated one-fifth of \$5,000, or \$1,000, leaving a book value during the second year of \$4,000. If this \$1,000 difference between the value of the truck during the second year as compared with the first is not put into some sort of fund where it earns 6 per cent interest, it may be justifiable to charge 6 per cent on the full \$5,000 value of the truck during the second year and during each of the succeeding years or during each of the 5 years assumed to represent the life of the truck.

If this \$1,000 fund is put into the bank or invested in any other way so as to earn the legal rate of interest, it is only necessary to figure 6 per cent on the \$4,000 during the second year of the truck's life. The interest at 6 per cent on \$4,000, the book value of the truck during the second year, plus the 6 per cent on the \$1,000 sinking fund or amortization charge, will be identical with the 6 per cent interest on the full \$5,000 initial cost of the vehicle. Thus it is seen that there is in reality no new investment, but the original one stands indefinitely.

Assuming that a sinking fund is carried by the concern owning the truck and that the money in the fund is invested so that it earns at least the legal rate of interest, the varying book value of the same trucks, as in the example just mentioned, may be assumed as the amount of investment on which the interest charge must be calculated. For the first year this would be \$5,000; for the second year, \$4,000; for the third year, \$3,000; for the fourth year, \$2,000, and for the fifth year, \$1,000. At 6 per cent, the interest on the investment charged for the first year would be \$300; for the second year, \$240; for the third year, \$180; for the fourth year, \$120, and for the fifth year, \$60. The summation of \$300 plus \$240 plus \$180 plus \$120 plus \$60 gives a grand total of interest on the varying investment over a 5-year period of \$900.

This method of figuring interest requires a separate calculation for each year, or five operations in all. Some truck owners employ a formula whereby the average interest charged over the 5-year period may be calculated at one time and the same charge made each year. This formula contains two factors which are multiplied together to give the average yearly interest charged.

The first factor is the number of years taken as the assumed or book life of the

truck plus 1 divided by the book life of the truck. The second factor is the initial investment of the truck minus tires times the rate of interest charged, divided by 2. In the example cited above, the first factor would be 5 for the assumed life of the truck plus 1 divided by 5 or 6/5. The second factor is 6 per cent times \$5,000 equals \$300 divided by 2 equals \$150. The \$150 multiplied by 6/5 gives \$180 a year as the average interest on investment charged. This is the same as would be obtained by figuring the interest on the \$5,000, \$4,000, \$3,000, \$2,000 and \$1,000 amounts during the first, second, third, fourth and fifth year, as was done above and which shows a total interest on the investment charge of \$900 for the 5-year period. Of course, the average charge per year for \$900 over a 5-year period would be \$180 each year, which is exactly

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

Make use of it.

The editors will be glad to answer any questions which you ask.

## Answers

the same as obtained through the use of the formula just given.

While this average charge does not, of course, give an accurate yearly interest figure with the variation in the investment minus the sinking fund from \$5,000 the first year to \$1,000 during the fifth year, it gives a fair charge over the entire period of the life of the truck. This is really more important, since it tends to even up the charges for this item during each year so that it is not excessively high the first year and exceedingly low during the fifth year.

## Driveshaft and Universals on GMC Model 31 Truck

To the Editor, COMMERCIAL VEHICLE:

Please describe the driveshaft assembly on the Model 31 GMC truck.—J. C., Brookline, Mass.

This shaft is in two sections with three

universal joints and supported at the center by a self-aligning double row ball-bearing, which is fully protected by felt washers, one on each side of bearing, which also retains lubricant. This bearing is so constructed that the shaft may take any angle necessary without cramping or affecting bearing in any way. The inner race of this bearing is tight fit on the shaft and held in place by two collars—the forward collar having a headless set screw holding it to the shaft. The universal joints are of the sliding block type and fully universal. All slip is taken inside of the universal joints by the blocks X, sliding in a square machined surface or housing R. This joint should be disassembled in the following manner.

Remove the cap screws H which permits the oil retainers and cover to be slipped back on the shaft. Remove all bolts B. This permits the housing R to come forward disassembling the joint. In replacing the blocks X on the trunnion head which is the square block on the end of the shaft on which the blocks X are fitted. It is essential that these parts be fitted until they work perfectly free in the housing R. There should be a loose fit with .002 or .003 in. clearance for expansion. Replacing the above parts should be watched carefully and instructions followed according to the above.

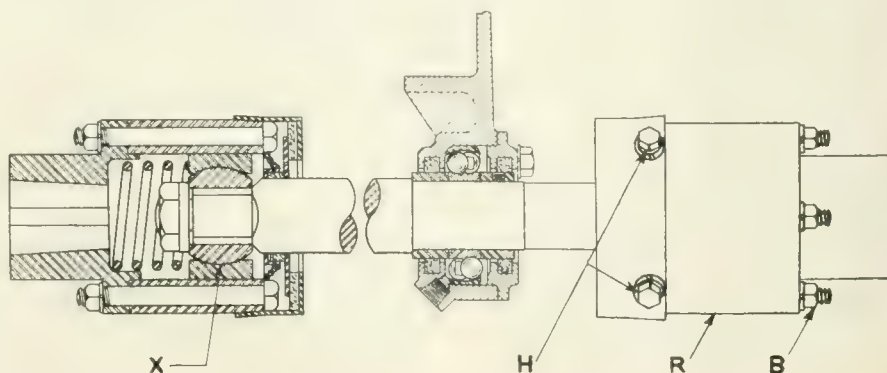
A medium grease mixed with graphite is recommended for lubrication and should be of the proper consistency to be forced backwards and forwards in the joint as the position of the trunnion head and the blocks require, especially when the truck is in operation and under load.

## Wants Information on Adjustment of Diamond T Clutch

To the Editor, COMMERCIAL VEHICLE:

I am operating a Model J-3 Diamond T truck and would appreciate any information on how to adjust the clutch.—J. D., New York City.

The clutch used on your truck is of the dry plate, multiple disk type. In case the clutch slips, examine the clutch pedal and see that it does not hit against the floor boards when the clutch is engaged. This would tend to prevent the clutch from engaging properly. To overcome this, adjust the length of the coupling link from the pedal to the clutch. An adjustment yoke is provided for this purpose. "Riding" the clutch pedal with one's foot will tend to cause slipping.



Details of the driveshaft and universals used on the G M C Model 31 truck



In all cases, when the clutch slips, remedy the trouble before driving further. Continued slipping will burn out the facing, and this will necessitate replacing latter.

The tension of the clutch spring may be increased by tightening the three adjusting bolts on the clutch, thus increasing the compression of the spring.

The clutch throw-out or release bearing should be lubricated every week. To do this, remove the plate from the top of the gearset case, pour about one or two tablespoonsful of heavy transmission oil over the release yoke. The oil will then work into the bearing.

**Poor Compression May Be Due to Scratched Cylinder Wall**

To the Editor, COMMERCIAL VEHICLE:  
I recently ground my valves and cleaned out the carbon, believing that in so doing I would eliminate the loss in power through poor compression. I am still troubled with a loss of power and would like to know just where my trouble lies.—S. B., New York City.

Poor compression is caused very often by deep scratches on the cylinder and piston walls, the force of the explosion being dissipated by a leakage past the piston rings. These scratches are often caused by deficient lubrication, or when the lubricant is not supplied in proper quantities. In that case, the piston is apt to cut the cylinder, resulting in a series of fine scratches. While these are not as deep as those caused by a loose wristpin, they may still have sufficient depth to permit a bad leakage. Grinding out a cylinder often eliminates fine scratches. In that case it will be necessary to fit larger pistons and rings.

**Right and Wrong Way of Applying Split Pins**

To the Editor, COMMERCIAL VEHICLE:  
I would like to know whether there is a right and a wrong method of applying cotter pins or wire in rod connections or on castellated nuts?—A. BROWN, Newark, N. J.

The only case in which there is a right and wrong method of applying split pins is that in which the pin may be put in from above or below and the cotter applied on the side opposite the head. In that instance, it is correct to place the head on top and the cotter on the bottom side, as then, even if the latter be shaken out or lost, the through pin will still remain in position because of its own weight.

If the process were reversed, and the head placed at the bottom, so soon as the cotter shook out or was lost, the weight of the through pin would cause it to fall out. The same might be said of castellated nuts on parts which may be put in from either the top or the bottom. For those also it would be correct to put the head at the top and the nut with its cotter or wire at the bottom, as even if cotter or wire were lost and the nut shaken off in addition, the weight of the piece would tend to keep it in the original position.

Where either piece is horizontal or where no choice is offered, there is no correct or incorrect position.

**Origin of the Term Hotchkiss Drive—Its Meaning**

To the Editor, COMMERCIAL VEHICLE:  
What is the derivation of the term Hotchkiss drive and what does it mean? —H. GRANT, Jersey City, N. J.

The Hotchkiss drive gets its name from Hotchkiss, who was an American engineer and designed the Hotchkiss car made in Paris, France. That vehicle was the first shaft-driven passenger car made that did not have some form of radius rod, torque arm and torsion tube or other members to retain the axle in its proper relation to the shaft.

In brief, Hotchkiss drive means the taking of both the driving propulsion and torque through the springs instead



**The Forum Solves Problems!**

THE COMMERCIAL VEHICLE  
Forum Dept. will answer any question on trucks and trucking such as those on this page.

If you have any problem, write to the Forum about it!

**Let Us Help Solve Yours!**



of through radius rods, torque arm or other members designed to accomplish the same results.

When Hotchkiss drive is used, the springs must be made of the very best possible material in that they have to withstand the driving and torque strains in addition to supporting the load. It is also necessary to prevent any serious telescoping action on the propeller shaft when the Hotchkiss drive is used and also to lay out the brake rods and linkage so that the brakes are not affected whether the truck is loaded or not.

**Tire and Truck Depreciation and How to Figure It**

To the Editor, COMMERCIAL VEHICLE:  
On what basis is the depreciation of tires figured and what would be a fair basis to figure depreciation of a truck? —H. JOHNSTONE, New York City.

Perhaps the best method of figuring tire depreciation is on the basis of the cost per mile. Divide the original cost of the tire by the number of miles which it is guaranteed to run. This will give you the unit cost per mile. If your truck runs 100 miles per day, the charge for tires would be 100 times the unit cost per mile. If the tire gives more than the guaranteed mileage it is usual to consider the additional mileage as an extra saving which is not calculated in the cost records, but rather to draw upon in case

the tire which runs less than the guaranteed mileage is not adjusted satisfactorily.

In ordinary work the usual plan in figuring truck depreciation is on the basis of a life of 5 yrs. This would make the owner charge off a depreciation of one-fifth the original cost each year. At the end of the 5 yrs. he would thus have enough money to buy a new truck from that which has been laid aside during the 5-yr. period. While the truck depreciates less in the first and second years than it does in the third, fourth and fifth years, it is usual to make the depreciation equal over the 5-yr. period, as this saves considerable bookkeeping and other clerical work.

Some owners whose trucks are engaged in especially arduous service depreciate their vehicles at the rate of 33 1/3 per cent a year. The conditions under which your trucks are operating will enable you to judge for yourself whether they will last for 3 or 5 yrs.

Another method is to charge off the depreciation at so much per mile, assuming that the truck has a life of from 100,000 to 150,000 miles. Here again the conditions of service affect the total life estimated.

**Roloff Demountable Truck Bodies**

(Continued from page 37)

waiting to go out, which is then pushed onto the chassis.

It should be noted that the front corner of the catch on the side of the carriage is beveled. When this bevel strikes the latch on the side of the sub-frame, the latch is pushed out until the slot in the carriage catch is just opposite and the latch snaps into the slot. The truck is then ready to carry away its load, as soon as the helper releases the latch holding the chassis to the wedge-blocks.

The whole operation of bringing back an empty body and carrying away a full body takes an average of from 5 to 10 minutes.

There are no operating expenses connected with this equipment. And the company estimates that it will outwear the truck.

With the Roloff equipment, the time of loading and its cost are reduced, because the same men who formerly brought the goods and stacked them on the shipping floor can now put the goods directly into the bodies instead of piling them on the floor.

The Roloff system lends itself readily to improvements in methods of handling goods inside the loading station, such as inside track systems with turntables or switching systems, whereby goods for different shipping points can be segregated in different parts of the shipping room and bodies brought to these locations for loading or unloading.

The company is prepared to furnish skilled engineering advice and designs of equipment calculated to increase efficiency and save time and money under all conditions of truck operation.





## The Driver's Part in Maintenance

WHILE the driver generally takes no active part in the repair or maintenance of his truck, he nevertheless plays an important part in successful maintenance, and no system of maintenance can give full satisfaction unless the driver is taken into account.

The driver really holds the truck in the palm of his hand. The truck being properly designed, made of good material and put together properly in the first place, the driver is really the most important factor in successful maintenance.

The reason for this condition is not hard to find. Once the driver leaves the plant or store he is in absolute control of an expensive piece of machinery. Out on the road he is out of sight of the owner, the maintenance superintendent and his inspectors, unless the fleet is sufficiently large to warrant the employment of road inspectors. If the driver overspeeds his truck at times and loafs at others, jams on the brakes suddenly, lets the clutch in too quick, takes corners at high speed and does not change the speed gears properly, the wear which such abuse causes cannot be told unless by some means the driver is made an integral part of the maintenance system.

Many owners have made the driver take his place as an important cog in the gears of the maintenance system by the use of a daily mechanical report card. This card must not be confused with the more common driver's daily report card covering the work done, the mileage run, the gasoline

and oil consumed, etc., although the mechanical report may be made a part of the card to show the work done. In many cases the mechanical report has been provided for on the reverse side of the card for the work done. This is a simple method and makes necessary the use of only one card.

The kind of questions asked in the mechanical report has a great deal to do with the value of such a report. Where the driver is simply expected to drive his truck and not tinker with any of the adjustments or make any of the repairs, the questions must be of a simple and non-technical nature in order that they be answered intelligently. It does no good to ask a driver with no mechanical training if the valves are seating accurately or if the magneto distributor points are functioning properly. He could not answer such questions intelligently. But if he were asked if his truck engine had power, he could answer "Yes" or "No" quickly and without hesitation. If such a question were answered in the negative, it would at once indicate to the inspection repairman that he should look for leaky valves, worn magneto distributor points, broken spark plugs or other causes which produce a loss of engine power.

In the same manner, questions such as: "Do your brakes work properly?" and "Does the truck squeak or rattle?" while almost too simple at first thought to be of any value, open up trains of thought on the part of the trained repairman that will lead him at once to the source of the trouble.

## The All-Seeing Eye

THE "all-seeing eye" mentioned in the head above, does not, as you might have guessed, refer to the title of the latest melodramatic "movie." Instead, it carries a message to the truck maintenance superintendent and refers to Daily Inspection as the All-Seeing Eye of successful truck maintenance. No matter how good is the truck repairshop, its equipment, tools and working personnel and no matter how good is the driver's daily mechanical report, neither will make possible satisfactory truck maintenance unless the trucks

are subject to the scrutiny of daily inspection.

Daily inspection is the means whereby the information contained on the daily mechanical report cards is made of value and utilized to cut the cost of the repair work which may be further reduced through adequate machinery and tools in the repairshop. Daily inspection is the "stitch in time which saves nine." It is the "ounce of prevention which is better than the pound of cure" and which catches small repairs before they become big ones and little squeaks before they become big rattles.



## Over 1 Billion Tons of Freight Handled

### Astonishing Development Made in Motor Truck Transportation in United States

NEW YORK CITY, Feb. 9—Motor trucks carried 1,200,000,000 tons of freight in one year, according to George M. Graham, vice-president of the Pierce-Arrow Motor Car Co., Buffalo, N. Y. Mr. Graham recently made an analysis of present conditions and the immediate outlook in the motor truck field. In presenting the results of this analysis before the annual meeting of the Motor and Accessory Manufacturers Assn. in New York City, Mr. Graham contrasted the development of other means of transportation with the motor truck.

In making this contrast, he stated that in one year the interurban trolleys of this country transported 4,000,000 tons of freight. Over the Mississippi and the Great Lakes went 90,000,000 tons. The railroads carried 2,504,000,000, or a little over one-half that carried by motor trucks.

He also gave some interesting figures to show the exact place the motor truck occupies in the scheme of transportation. There are in the United States 15,000 miles of inland waterways, 18,000 miles of interurban electric tracks, 205,000 miles of railroads and 2,750,000 miles of eventual, possible highways.

### American Made French War Trucks Sold at N. Y. Auction

NEW YORK, Feb. 8—Sixty-six trucks including Packards, Macks, Pierce-Arrows, Whites and Rikers, originally bought by the French Government and shipped to France and recently returned to this country, were sold at public auction at the L. & F. garage in Brooklyn here to-day by Samuel T. Freeman & Co. Philadelphia auctioneers. All of the trucks were fitted with standard army types of bodies. All of the trucks had seen some service although some few had been driven less than 500 miles according to the odometer readings and the appearance of the tires. All of the trucks had been on public exhibition out in the open for 3 days preceding the sale and were started, driven inside of the garage in front of the auctioneers and sold to the highest bidders.

The consignment consisted of ten 2-ton Whites; ten 2-ton Packards and five 3-tonners; sixteen 4-ton Rikers; five 5-ton Pierce-Arrows and five 2-tonners and fifteen 5½-ton Macks, all with cabs.

All of the trucks were bought "as is." Two of the 2-ton Whites, all of which were of 1918 models, were bought in at \$1,300 and \$1,325 respectively by individual buyers with the remaining eight apparently bought in by an insider at \$900 each. The 1918 list price of these trucks without bodies was \$3,300.

The ten 2-ton Packards, some of which were equipped with generators for electric lighting, which listed at \$3,200 in

the chassis, were sold for a total of \$13,200 or at an average of \$1,320. The lowest selling bid was \$1,225 and the highest \$1,400. All of these Packards were bought by individual users whose business included shoes, chemical works, general trucking, iron dealer, farmer, builder, granite dealer, butcher and dye business. The five 3-ton Packards which originally listed at \$3,900, went for \$10,850 or an average of \$2,170. The lowest selling bid was \$2,125 and the highest \$2,275.

The first two of the 4-ton Riker trucks which originally listed at \$4,050, went for \$2,050 and \$1,150 respectively. The balance sold for \$850 each.

Three of the 5-ton Pierce-Arrows which listed at \$5,000 in the chassis, went respectively for \$2,225, \$2,250 and \$2,100. Two others went for \$1,700 each. The first two of the five 2-ton Pierce-Arrows, originally listed at \$3,300, went for \$1,400 and \$1,325 respectively and the remaining three models at \$1,200 each.

The first of the 5½-ton Macks, which listed at \$4,750 in the chassis, went for \$2,450.

### Passes Bill to Sell Army Trucks

WASHINGTON, D. C., Feb. 8—Now that the House has passed the Army bill carrying the Anthony proviso for the disposal of 10,000 army trucks to the public, fleet owners are wondering just how much of a speculation the purchase of these vehicles will entail. A large number of these trucks have been in operation for some time. Others, though not used, have been exposed to the elements. Being sold at auction, the trucks will go "as is." Under these conditions, a prospective buyer is placed at a disadvantage, unless he is an expert appraiser of truck values. If not, it would be necessary to take along with him at the time of the auction a man competent to judge whether he is getting his money's worth.

### Orders 100 Trucks

INDIANAPOLIS, IND., Feb. 8—The Red Ball Transit Co., this city, has placed an order for 100 Acason trucks. It is the plan of the company to extend its operations so that it will be doing inter-city transportation throughout the country.

The company was organized three years ago. Heavy-duty trucks with large enclosed bodies resembling moving vans are used. The main lines now operate to cities between Indianapolis and New York via Cleveland on one route and via Pittsburgh on another. Another line is between Indianapolis and Chicago, another between Indianapolis, St. Louis and Kansas City.

The main headquarters are in Indianapolis, but offices are being established in Chicago, Cleveland and other important cities.

No local hauling is done. It is the intention of the company to extend its activities so that the routes reach as far west as the Pacific Coast.

The company has been very successful in moving household goods.

## Prohibitive Tax for New York Trucks

### Legislators Would Tax Trucks of 5-Ton Capacity and Over Off the Roads

ALBANY, N. Y., Feb. 8—A strong effort will be made by the New York Legislature to "tax heavy motor trucks off the roads," of this state, according to legislators who are engaged in drafting motor vehicle legislation to meet recommendations embodied in Governor Miller's annual message.

Annual fees of \$500 are being proposed for trucks of 5 tons carrying capacity, of \$600 for 6-ton trucks, of \$700 for 7-ton trucks, and of \$800 for 8-ton trucks. Trucks of less than 5 tons would be permitted to operate for from \$50 to \$90 a year.

"The high tax on motor trucks," said Senator Seymour Lowman, Chairman of the Senate Committee on Internal Affairs, "is being proposed with the deliberate purpose of putting an end to the use of super-motor trucks on our roads. We cannot drive them off the roads but we propose to tax them off. They tear up the roads frightfully and make not only the upkeep of the roads but the cost of construction and maintenance of bridges along the State roads prohibitive. The interests involved must be compelled by the only means at our disposal to distribute the weight of their loads and use smaller trucks."

### To Handle Store Deliveries

ELGIN, ILL., Feb. 10—The Mutual Delivery Co. has been organized in this city and will take charge of the delivery departments of most of the leading stores. Twenty firms signed contracts and it is hoped to increase this number. The new concern starts out with seven motor trucks and a motorcycle. The headquarters of the company are at 53 Douglas Avenue.

### Truck Census Throughout Country

NEW YORK CITY, Feb. 8—A census of the motor trucks of the United States was authorized by the Motor Truck Committee of the National Automobile Chamber of Commerce at its meeting here. It will extend to all communities in the country and will determine the conditions of the trucks, for what they are being used and their tonnage.

This census will be supplemental to the survey now being made of the use of motor trucks on farms, and when both are complete it is expected that practically every truck in the country will be listed.

### Clydesdale Service in New York

NEW YORK CITY, Feb. 8—The Clydesdale Motor Truck Co. has opened a factory branch in this city. The service station has been opened at 600 East 20th St., with G. B. Godfrey in charge.



## Gasoline Prices Drop All Over Country

### Big Refining Companies Make Reductions in Eastern and Midwestern Territory

NEW YORK CITY, Feb. 3.—Announcement of reduction in prices of gasoline and crude oil in virtually all the eastern and midwestern territory have been made this week by the various oil companies. This follows other cuts made in the past few weeks. The first reduction thus far made in the New York and New England territory was announced by the Standard Oil Co. of New York, which marked down gasoline 1 cent a gal. The Standard Oil Co. of New Jersey also announced a cut of 1 cent, the second in the past two months.

The Sinclair Refining Co. has reduced gasoline 2 cents a gallon in Cleveland and has made a second cut in a month in Chicago, where the price at filling stations is 25 cents and for tank wagon delivery 23 cents. The same price has been made by the Standard Oil Co. of Indiana for the entire midwest territory.

Gasoline reserves are gradually increasing, according to refining statistics compiled by the Bureau of Mines for November, 1920, which shows an increase of 50 per cent in the daily average output as compared with 1918. Production of gasoline for November increased by 62,000 gallons daily over the October output. Total stocks at refineries Nov. 30 amounted to 354,835,764 gallons as compared with 378,133,185 gallons for the same month last year and 270,072,011 gallons in November, 1918.

### New York Ahead of Ohio

NEW YORK CITY, Feb. 4.—Ohio and New York are still running a close race for the honor of having the largest number of motor vehicles. On Dec. 31, 1920, New York had 658,165 motor vehicles as compared with Ohio's 632,585. Ohio actually led New York in the number of passenger cars, but the latter state more than made up for this difference by its larger truck and omnibus registration, having 132,524 while Ohio only had 83,300.

### Midwestern Highway Conference

ANN ARBOR, MICH., Feb. 9.—Under the auspices of the Permanent Committee on Highway and Highway Transport Education, the University of Michigan and the Michigan State Highway Dept., a Midwestern conference on highway and highway transport education will be held in this city on Feb. 23.

The program will include the following papers: "The Economics of Highway Transport," by Roy D. Chapin, vice-president of the National Automobile Chamber of Commerce; "Highway and Highway Transport Education in Secondary Schools," by George C. Diehl,

chairman of the Good Roads Board, American Automobile Assn.; "Snow Removal from Transport Routes," by C. J. Bennett, State Highway Commissioner of Connecticut; "Highway Transport and the Industry," by Tom Snyder, secretary of the Indiana Highway Transport and Terminal Assn.; and "Interrelationship of Highway Transport and the Back-to-the-Farm Movement," by A. R. Kroh, of the development department of the Good-year Tire & Rubber Co., Akron.

### Truck Course at N. Y. U.

NEW YORK CITY, Feb. 8.—Automotive Transportation has been added to the regular course in Industrial Engineering at New York University beginning with the February term. The course will have more to do with the application of the motor truck than the mechanics of it and will include the following lectures: The Future of the Motor Truck, Motor Truck Operating Costs, Motor Trucks versus Horses, Motor Trucks versus Railroads, Trailers and Semi-Trailers, Special Bodies, Loading and Unloading Devices, Scheduling, Routing and Dispatching, Maintenance and Garaging, Hiring, Training and Retailing Drivers.

### Cab Company to Make Trucks

CHICAGO, Feb. 5.—The Yellow Cab Mfg. Co., this city, is planning to get into production on a 1-ton speed wagon and a 1½-ton speed truck. The company for several years has concentrated its efforts on turning out 2000 cabs yearly for use in taxicab service in this and other cities.

### New 1-Ton Kissel Truck

HARTFORD, WIS., Feb. 8.—A 1-ton speed truck, priced at \$1,585, has been placed on the market by the Kissel Motor Car Co., this city. The new truck is capable of a speed of 35 m.p.h. It is equipped with a new worm-drive rear axle, 34 by 5-in. pneumatic tires front and rear and has a wheelbase of 140 in., with a loading space of 8½ ft. For this new truck chassis, which has been styled the "Express," the regular Kissel engine, four-cylinder, 3½ by 5½ in. used in the 1½-ton "Utility" chassis, is employed.

The stripped chassis with pneumatic tires lists at \$1,585 at the factory.

### Coming Events

1921

- Feb. 23. . . . Ann Harbor, Mich. Midwestern Conference on Highway and Highway Transport Education under the auspices of the Permanent Committee on Highway and Highway Transport at University of Michigan.
- March 12-19. . . Boston, Mass., Truck Show, Armory, Boston Automobile Dealers' Ass'n.
- March 1-5. . . . Wilmington, Annual Motor Truck Show under auspices of Wilmington Motor Trade Ass'n, in Auditorium.
- March 14-17. . . Pittsburgh, Pa., Convention to be held at William Penn Hotel by International Retail Delivery Ass'n.

## Wilmington Merchants Need Truck Routes

### Will Then Have Equal Chance With Baltimore Tradesmen for Coveted Business

WILMINGTON, DEL., Feb. 7.—The Chamber of Commerce of Wilmington, in an effort to enable local merchants to have an equal chance with Baltimore, Md., tradesmen for the business of the Eastern Shore of Maryland, has gotten back of the project to establish truck routes running into that territory from Wilmington. Baltimore has been gradually establishing truck routes, while Wilmington has been depending on the Pennsylvania Railroad, which, having recently curtailed its shipping program in that territory, has proved a bit embarrassing to the local tradesmen. In connection with the Eastern Shore lines, it is proposed to establish others running into all sections of lower Delaware—where the railroads go and where they don't go.

While the Chamber, as stated above, is backing the project, it is merely acting as a booster and will assume no responsibility in the event of the establishment of these lines. This was made clear at a conference a few days ago with representatives of the shippers and also with motor truck men who are interested in the project. The motor men agreed to assume all responsibility if they were assured of proper support, and also to insure shippers against loss en route. The result was a decision by the Chamber to send a questionnaire to all merchants having trade in that territory or desiring it, to ascertain whether they would patronize the truck lines if established. As soon as the replies are in there will be another meeting with the merchants and motor men, and it will probably then be determined whether to go ahead with the project. The outlook is promising. One large truck concern made it known that it stands ready to start a fleet of trucks as soon as there is assurance of enough business to pay.

### Albany Buses Make Good

ALBANY, N. Y., Feb. 2.—Traction systems are not necessary, after all, Albany, Troy and neighboring cities are learning by experience. For 4 days not a trolley car has moved, as a strike was called because the United Traction Co. ordered a wage reduction. Almost overnight a system of motor bus service started runs over the routes of the traction company, and now there are more means of travel than the citizens of Albany can use. Moreover, the service is faster and more frequent than before, to the worry of traction operators.

### C. W. Reid Dies

WASHINGTON, Jan. 30.—C. W. Reid, manager of the Transportation Bureau of the Federal Highway Council, died to-day after a brief illness.



# The COMMERCIAL VEHICLE

Read by Fleet Owners

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. O. Building  
231-241 West 39th Street, New York

## CONTENTS

Vol. XXIV, No. 3

March 1, 1921

### LEADING ARTICLES

How the Unit Repair System Saves Money.....	69
New Ramp for Truck Garages.....	74
The Battle Against Snow—12—Weather Reports and Organization .....	79

### MISCELLANEOUS ARTICLES

How Snow Equipment Saved \$60,000,000.....	72
Let's Learn to Like It!.....	75
Lower Coal Delivery Costs with Special Bodies....	82

### DEPARTMENTS

Rear Axle Repair and Adjustment—8—Walker Bevel-Drive Axle.....	76
The Better Way.....	84
New 5-ton Standard Has Larger Engine.....	88
Cyclone Enters Truck Field with 1½-Tonner.....	89
Warner Brings Out Two-Way Dump Body.....	89
Shop Equipment, Time and Money Saved in Truck Repairs .....	90
New Accessories and Parts.....	92
The Editor's Viewpoint.....	94
The Fleet Owners' Forum.....	95
Motor Truck Electric System Wiring Diagrams....	98

### NEWS

Federal Road Plan Is Unsatisfactory.....	99
Unserviceable Trucks Sold by Army.....	99
Freight Congestion in Philadelphia.....	100
Boston Show to Have 57 Makes of Trucks.....	100

INDEX TO ADVERTISERS.....88-89

## The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT

David Beecroft, Directing Editor  
Ray W. Sherman, Executive Editor

Joseph Hasson, Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

Chicago, Mallers Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law.....	.50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



# FAITH

WYMAN-GORDON'S entrance into the automotive field, some years ago, was to give substance to a steadfast faith in its future.

We believed that the automotive industry was a necessity to the vital forces of a fast-moving world. And this prophetic vision of a new and greater transportation is realized today in an industry of tremendous proportions.

This same resolute faith animates us now, when a passing cloud casts a temporary shadow over the world's business hopes.

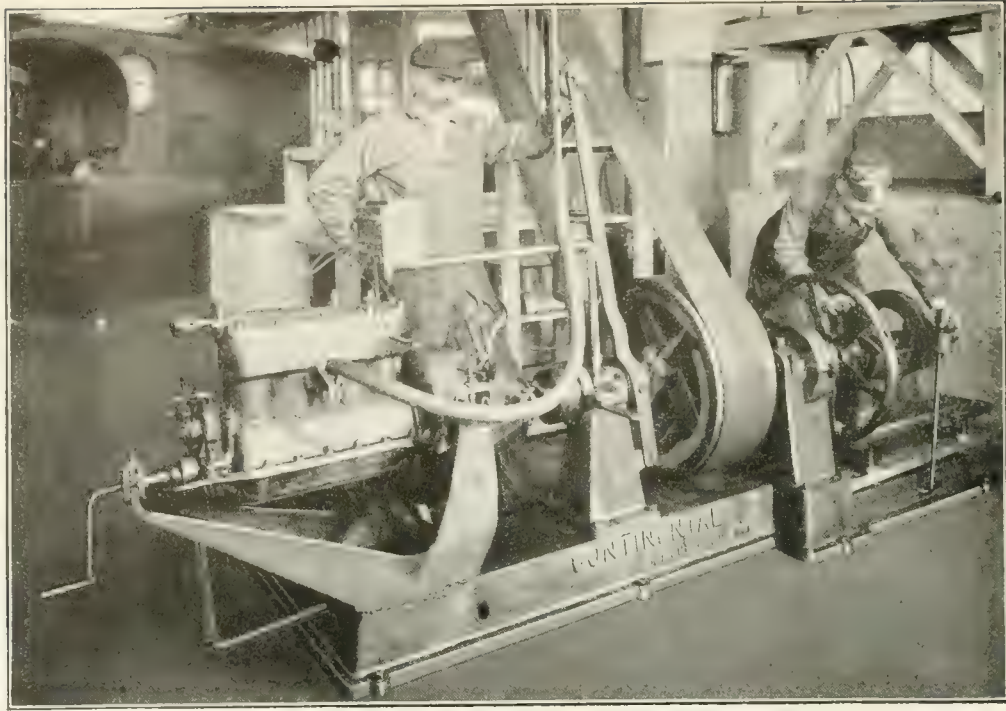
## Wyman-Gordon Co.

"The Crank Shaft Makers"

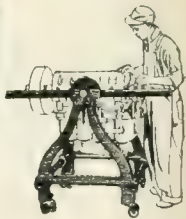
Worcester, Mass. Cleveland, Ohio

Chicago, Ill.

Service  
Department.  
Wangelin &  
Sharpe, the  
"Personal  
Service"  
Ford  
dealers of  
Indianapolis



Continental  
Equipment  
is enabling  
thousands of  
repair men  
thruout  
the country  
to turn out  
better work  
in less time



## "Personal Service"

Wangelin and Sharpe, Ford dealers of Indianapolis, are well known for their personal service to Ford owners.

Step into the fine service department of this company and you'll find Continental Shop Equipment solving every service problem, quickly and efficiently. And in thousands of the better class service stations, garages and repair shops throughout the country you'll find the Efficiency Standard building a bigger and better business for its owners just as it has for Wangelin and Sharpe.

This efficient equipment means more than better work in less time. It means better satisfied employees, and most important of all—better satisfied customers.

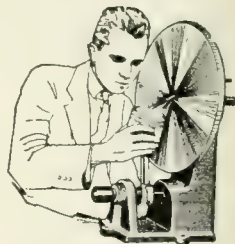
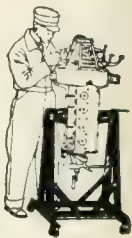
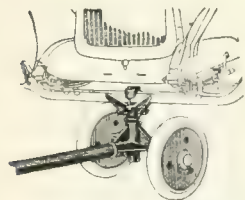
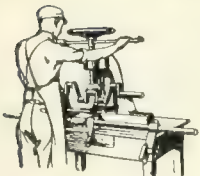
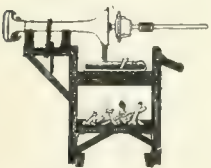
See that your shop is equipped with the line that is universally recognized as the best by manufacturer, dealer and repairman—Continental.

Write today for catalog of the complete Continental Line.

**Continental Auto Parts Co.**

2103 East Seventeenth Street  
Columbus, Indiana

*Manufacturers of*



**CONTINENTAL**  
*"The Efficiency Standard"*  
**SHOP EQUIPMENT**



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Vol. XXIV March 1, 1921 No. 3

*How the*

## Unit Repair System Saves Money *Saves 30 Days Layoff Per Truck Per Year*

**This Article Describes the System in Relation  
to Spare Parts and Outlines the Parts Stocked  
by One Owner for a Large Fleet of Trucks**

THE unit repair system is one of the most important, if not the most important, money saving developments of modern truck maintenance. Yet there are still many fleet owners, the size of whose fleets would justify the installation of this system, who have not installed it.

Few fleet owners would refuse a check for, say, \$10,000 up to \$100,000, paid free, gratis and for nothing into the business. Yet the installation of the unit repair system means putting some such sum into the business, and without taking it out somewhere else.

Of course the one case is not quite so simple as the other. The unit repair system may require a lot of figuring and some trouble, as well as an original outlay which may at first sight look uneconomical and therefore prohibitive. But it pays big money in the end, in most cases. And it is the final analysis that counts.

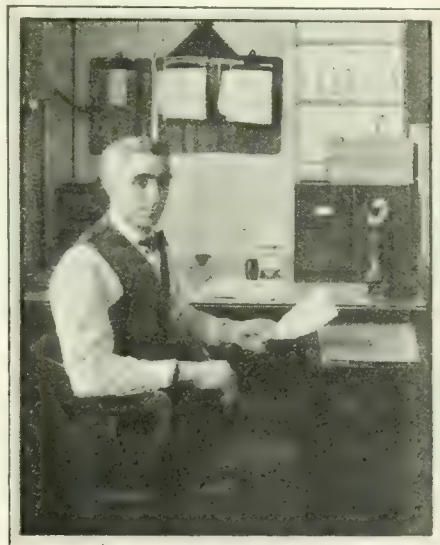
### **Because Time Is Money**

In an efficiently handled business, there will be enough work to keep a truck running practically all of every working day, allowing a reasonable margin for loading and unloading. Under ideal conditions, that would mean that a truck would be on active haulage work 300 days in the year, allowing 52 Sundays and 13 holidays.

But no truck can work under ideal conditions, because during a certain portion of the annual working days it will be laid off for repairs. The number will, of course, vary, but 30 days is probably a good average, as this would allow 14 days for the annual overhaul and 16 days laid off for the average amount of necessary engine, transmission and rear

axle repairs. In addition, at least 10 days must be allowed for layoff on account of changing tires and for other truck parts requiring repair.

This is 40 days out of the 300 on which the truck is not working, so that that figure is cut down to 260 days, which is probably an overestimate for trucks working in any kind of heavy haulage work which subjects them to a severe strain. And it is certainly an over-



*Adam Horr, a big fleet superintendent who has tried and proven the Unit Repair System*

estimate if the trucks are overloaded. Under average conditions, 250 days is probably nearer to the average yearly total days worked.

With operating, maintenance and fixed costs what they are to-day, it will cost the average truck operator \$20 per day

to operate a truck. Costs range from \$12 per day to \$28 per day, according to capacity, but the average is around \$20. Thus it is clear that the average 50 days per year during which a truck is laid off for repairs cost the owner 50 times \$20, or \$1,000.

But this is an under-estimate—and for this reason. If the business is on a sound financial basis the truck must, on the average, earn more per day than it costs. It would be difficult, if not impossible, to estimate an average for the amount which the truck earns in excess of what it costs. But from the data available on this question, 25 per cent would seem not to be an over-estimate. Therefore, every day that the truck is idle for repairs, the owner loses an additional \$5 for average net profit. Adding this for the 50 days to the \$1,000 above gives \$1,250 lost to the owner per truck for days idle due to repairs.

### **How Can It Be Saved?**

It must be remembered that the above figure is for one truck. But a business operating trucks on a sound financial basis will not own more trucks than it can conveniently employ all or very nearly all the time, provided the trucks can be operated. Therefore, a fleet owner whose business calls for 50 trucks, and who owns 50 trucks, is losing not \$1,250 but 50 times this amount, or \$62,500 on the entire fleet for the days laid off for repairs.

Of course, this loss cannot be entirely eliminated, because it is impossible to construct either imperishable roads or imperishable trucks, and there will always be the need for repairs. But from 50 to 75 per cent of it can be saved—and by the unit repair system.

The principle of the system is this. Only a small proportion of the time dur-



## Do You Want to Save Thousands Each Year? Have You Tried Out the Unit Repair System?

ing which the truck is in the garage is occupied in work on the truck itself. The rest of the time is usually taken up in repairs on some part of the truck which has been removed from it. If it were possible to save this time, the repair time would be greatly cut down. It is this saving which the unit repair system accomplishes.

The idea is to stock sufficient spare parts so that when anything goes wrong with any part of the truck, the damaged part or unit can be removed and instantly replaced with a new and undamaged or an efficiently repaired part. The truck can then be put back on the road while the loss of time is limited to the time required for disassembly and reassembly, and the damaged part can be repaired at leisure and be ready to replace some other damaged part at some future time.

### The System Has Been Proven

In actual practice the system has shown all the advantages claimed for it; in fact, it has cut down the actual time laid off to something like 10 days instead of 50. Thus, it has saved 40 days per truck and saved almost \$1,000 per truck per year. This sum is 40 times the \$25 estimated net profit and operating cost per day.

It has not saved quite this amount because the maintenance department under the unit repair system is more costly than when only a day to day supply of spare parts is carried. But it would not be fair to charge off the cost of the spares carried against the amount saved by the system. These spares will be used eventually in any case.

The amount invested in them is, therefore, not lost. Only the interest on the money tied up in the spare parts is chargeable against this saving. But in comparison to the amount saved, this interest is almost negligible.

For the last four years Adam Horr, superintendent of the Adolph Gobel fleet in Brooklyn, has employed the unit repair system with complete success. The fleet consists of 70 trucks made up as follows: Twenty Whites of 1½-ton capacity, 17 Whites of ¾-ton capacity, 13 Autocars of 2-ton capacity, seven Hudfords of 1-ton capacity, seven electrics of various capacities, four Dodges of ½-ton capacity, one 5-ton White and one 15-ton Pierce-Arrow tractor and semi-trailer.

The value of the total stock carried for this fleet of course varies with the number of trucks of the same make and capacity. The total value of parts is about \$12,000. This amount is made up as follows: The parts stocked on the

Whites are worth about \$5,000, those on the Autocars about \$2,500, those on the Ford about \$1,000, those on the Pierce-Arrow, the electrics, and the Dodges, about \$1,000 in all. The remaining \$2,500 is the value of the stock of tools, tires, chains, fenders, etc.

Thus, the value of the spare parts on the fleet is \$9,500. On a percentage basis this works out at 50 per cent for the 38 Whites, 25 per cent for the 13 Autocars, 7 per cent for the seven electrics, 10 per cent for the seven Hudfords, 6 per cent for the four Dodges, and about 2 per cent for the 15-ton Pierce-Arrow and for the company's Alco service car.

### Proportional Value of Parts for Different Makes

Trucks	Value of Trucks	Value of Parts	Per Cent
38 Whites ..	\$113,200	\$5,000	4.4
13 Autocars ..	29,900	2,500	8.4
7 Fords ...	3,815	1,000	26.2
7 Electrics ..	20,036	750	3.7
4 Dodges ..	4,340	250	5.7

\$9,500

Tools, Chains, Fenders, etc. \$2,500

Total Value of Stock .... \$12,000

**Value per Truck—\$173.91**

The interest on this \$10,000 at 6 per cent would be \$600 per year. On the other hand, careful inspection and replacing parts whenever damaged has, in this fleet, eliminated the necessity for the annual overhaul. And the unit repair system has further reduced the time laid off for repairs so that the trucks actually can operate about 290 days in the year, although they do not all reach this total at all times, because of the nature of the work involved. Still, the potential saving is there and a large proportion of the actual saving.

If, then, the company saves 40 days at \$25 per day, or \$1,000 per truck, the saving on the entire fleet is 70 times this amount, or \$70,000. From this must be deducted the \$600 interest on the investment in spare parts, which is, in comparison, negligible.

The values quoted above on the spare parts carried are from pre-war prices, because these parts were almost all purchased before the war and would probably cost 50 per cent more at the present time. But even the additional outlay of \$5,000 and the \$300 interest on it would not materially affect the tremendous saving accomplished by the unit

repair system in this particular instance.

A statement of the parts carried as regards value and percentage is shown in the box on this page. But for an example of what one fleet owner and one experienced superintendent have found necessary for the best operation of the unit repair system, a statement of the actual parts carried would probably be of interest, at least so far as the larger parts are concerned.

For the 38 Whites, the stock carried consists first of two engines and one spare engine block complete with pistons and piston pins, ready to install. Next, one complete gearset and one complete differential assembly is carried for each size, ¾- and 1½-ton. Next, two extra rear wheels, and two extra front wheels complete with hubs are carried, and two front and two rear hubs only. Also three extra White radiators, two extra gasoline tanks, a complete front axle for each size, four rear springs and four front springs are kept in stock.

Some of the smaller parts kept for the Whites are the following: Two spare water pumps, one complete carburetor, three complete magnetos, one oil pump and one oil box, one crankshaft, one complete clutch assembly, two drive shafts, two rear axle spindle shafts, one complete set of gearset gears not assembled and one complete set of differential gears not assembled.

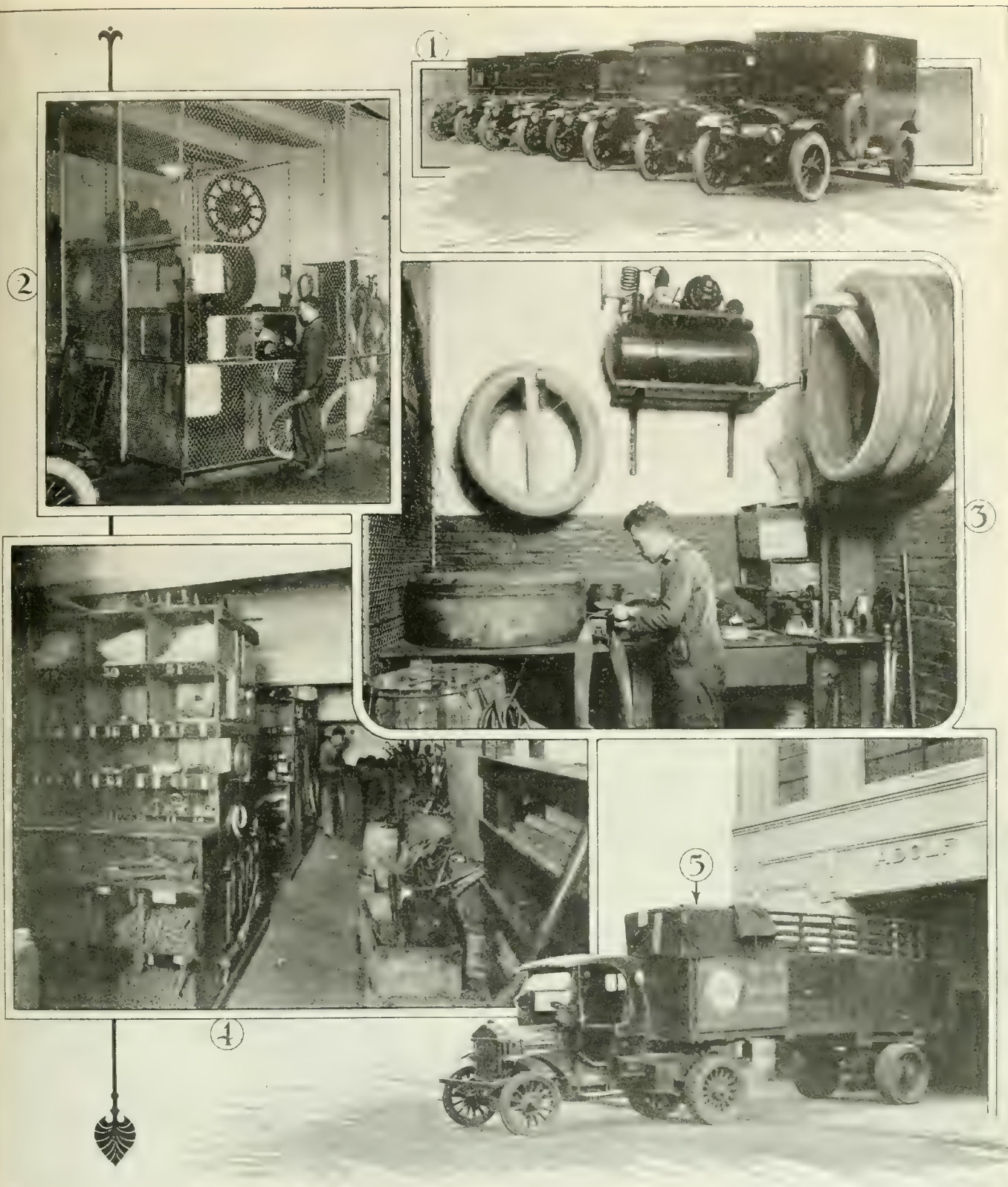
Enough material is also carried to make up six complete universal joints. When down to four, two more sets are purchased. Still smaller parts, such as connecting rods, bushings, radius rods, etc., are kept in proportion. For example, 48 piston pins are carried. Of these, 12 are standard, 12 are 0.003 in. oversize, 12 are 0.006 in. oversize and 12 are 0.009 in. oversize, etc.

### Other Fleets in Proportion

The stock of spares carried on the Autocars includes one spare engine complete and two extra cylinder blocks. In addition, there are two spare magnetos complete and two spare carburetors complete. For the rest, the stock of spares as regards assemblies, gears, wheels, axles, radiators, etc., is the same as for the Whites. The total value of the Autocar stock of spares was about \$2,500 when purchased.

The stock of spare parts carried for the fleet of Ford trucks includes one engine complete and one cylinder block with pistons. In addition, one set of 0.0025 oversize pistons and one set of 0.015 oversize pistons are carried, to replace the old pistons on trucks on which the cylinders have required reboring. Some of the other spare parts carried





1—A few of the White delivery trucks used for long distance runs. 2—Issuing spares to a mechanic. The stock room attendant takes a numbered check for each part issued. 3—Inside the cage. The stock room attendant also handles repairs on all tires and tubes. 4—View of section of stock room. Note spare springs at the rear. 5—The big Pierce-Arrow tractor and semi-trailer, used for hauling hogs from the slaughter house to the factory

are one rear axle complete, two extra front wheels and one extra rear wheel. On the Hudfords, the flywheel magneto is used for the horn only. All the trucks are equipped with Bosch magnetos, Edison storage batteries and electric lights. Two spare Bosch magnetos are kept in stock for the Hudford fleet.

The spares kept for the electrics include two sets of drive chains, one set of front and rear sprockets, one complete controller roller, one set of controller fingers, two steering knuckles, two spindle pins and a miscellany of smaller parts. The complete value is about \$500.

For the four Dodges only a few spares are kept, including a set of pistons, a set of main bearings, a set of connecting rod bearings, a front and a rear spring.

For the big Pierce-Arrow, one spare magneto, one spare carburetor, one set of brake shoes and a fan belt are kept.



# How Snow Equipment Saved \$60,000,000 New York's Purchase of Trucks and Plows Vindicated

**Last Year's Storm Cost New York \$60,000,000 in Business Losses Aside from the \$10,000,000 the Snow Cost the City to Clear. But This Year New Equipment Cleared a 12½ In. Fall With No Traffic Tie-up**

**T**HIS year, for the first time, snow did not catch the city of New York unprepared. A fall of from 12½ to 13½ inches in about 24 hours, the biggest fall in 30 years in that time, was a supreme test for the organization. But the city came through with flying colors. Over 20,000 men and 3000 vehicles cleared all the specified streets up to schedule and prevented any serious delay in traffic whatever.

There were four features of the city's campaign of material assistance in making this possible. First, the equipment, consisting of 150 tractors, 350 trucks, over 600 push plows, about 150 4-wheel pull plows, 1800 department carts and about 850 contractors' vehicles went to work very nearly on schedule time.

Second, the city's plan, begun last July, of training as many men as possible in four different schools in driving and handling this equipment made efficient work possible. By December 1 these four schools had trained 649 men as drivers of trucks and tractors, so that all these men passed their licensing tests and became licensed chauffeurs.

Third, for the purpose of snow removal, the entire city was divided up into

small zones, using the existing fire zone division with a fire station as the center of each zone. The equipment was distributed in these zones at the fire stations and every man assigned to his zone.

At the same time each police station had a list of snow fighting men living on the beats in that precinct and the police

=====

## We Have Urged This for Months

The Commercial Vehicle Has Been Urging Preparedness Against Snow, in a series of twelve articles, for months. New York City organized and bought equipment.

And the heaviest storm in 30 years found her prepared.

## What Is Your City Doing?

=====

were instructed to telephone to the police station the moment snow began to fall and get a list of the men living on their beats. In this way the auxiliary forces

were at their posts by the time the 14-14 call went out.

Fourth, the street railways have about 3,000,000 square yards of surface from which they are required to remove the snow altogether, not merely push it off the tracks onto the street. By agreement, the railway lines were given full streets from house line to house line approximating this area of 3,000,000 square yards, which they were to clean entirely and which they did clean. In return, they were allowed to clear the tracks with their sweepers and the city took care of the snow thus cleared.

Of the 150 2-ton tractors, 64 took care of the section between 14th Street and 72d Street with pull-plows and two push-plows. Below 14th Street the 4-ton tractors with push-plows handled the main streets, while trucks and push-plows cleared the side streets. Above 72d Street and in the Bronx, trucks and push-plows and 14 tractors with pull-plows cleared the specified area. In Brooklyn all the trucks and tractors used were stationed in a large armory and in Stable B of the D. S. C. Working from these points, 22 tractors and 83 trucks with 62 pull-plows and 43 push-plows cleared the streets specified.

The trucks bought and used by the Department for this work were of two



Trucks operated by the Fifth Avenue Coach Co. clearing up and down town traffic lanes on Fifth Avenue for the company's buses. Most of Fifth Avenue was cleared in this way, with the assistance of shovelers hired by the city and a few tractors and pulled plows from the city's equipment. The snow was piled in the center of the street



After up and down town traffic lanes had been cleared on Fifth Avenue, the snow piled in the middle was loaded into department 2-ton trucks with this Barber-Greene mechanical loader



capacities. There were 100 2-ton Mack trucks, newly purchased; 212 5-ton White trucks, newly purchased, and about 38 ton trucks, which the city had last year. All the tractors were new. They were listed under two capacities, there being 100 Cleveland tractors listed as 2-tonners and 50 Holt caterpillar tractors listed as 4-tonners. The push-plows were Champions and the pull-plows were Imaxes, all manufactured by the Good Roads Machinery Co.

The snow began to fall late Saturday night. By four Sunday morning the Street Cleaning Department call went out to its forces to be in readiness. At 10:03 the 14-14 fire call was sent through all the fire stations where the equipment was located throughout Manhattan and within two hours, or by 7 o'clock, the total force was at work, with the exception of the contractors' forces.

There were 951 miles of streets scheduled to be cleared. Within two hours after the forces got to work these streets were passable for traffic. By the time the storm ended the whole area was cleaned of snow sufficiently to prevent any interference with traffic. Under the original plan the plows were to operate in teams of two and to clean a width of 30 ft. of roadway for a distance of 3 near miles in one hour. Owing to the heavy snowfall, this could not be perfectly adhered to. Instead, the area to be covered was reduced in many cases to 15 miles.

### Sewering Started Early

Department carts and laborers started immediately sewerage and carting away the snow. By 7 o'clock Sunday morning there were 11,000 extra laborers and 850 contractors' carts on this work, and by Tuesday night many of the tractors had been put to work sewerage also. The men and vehicles actually engaged were 14 firemen, handling 114 tractors or pull-plows; 7,000 D. S. C. men, shoveling and handling 300 trucks; 11,000 extra help, shoveling and handling 1,800 department carts, and 2,000 men of the contractors' forces, shoveling and handling 850 contractors' vehicles.

The Fifth Avenue Coach Co., with the aid of Street Cleaning Department laborers and a few department trucks with push-plows, cleared up-and-down pathways on Fifth Avenue, piling the snow in the center of the Avenue. This snow was cleared Wednesday morning from 14th Street to 32d Street by the Barber Greene snow loader.

Although working under the most difficult of tests, the city's plan succeeded, the organization functioned practically to perfection, and there was no serious traffic tie-up. It is estimated that, for this reason, equipment recently purchased by the city with an appropriation of \$4,250,000 has more than paid for itself in this one storm, in the saving to the city. The estimated cost of the removal in this campaign is \$1,000,000 and there was practically no loss to the city's business. Last year the estimated cost of the removal was nearer \$10,000,000 and the traffic tie-up was estimated to have cost the city about \$60,000,000.



Two of the big Holt Caterpillar Tractors equipped with the push plows with which the main down-town streets in New York were cleared



The upper illustration shows some of the gang of shovellers employed by the city, supplementing the work of the Fifth Avenue Coach Co.'s trucks and plows in clearing the snow from Fifth Avenue. In the lower illustration is shown a Cletrac towing a pull plow. Note the fixture in front for a push plow



# NEW RAMP FOR TRUCK GARAGES

**Special Ramp Designed for the Big Fleet Garage  
to Eliminate Waste of Time in Using Elevators**

THE owner of a large fleet of trucks who contemplates the construction of a new garage has a problem before him. He may be rebuilding because his fleet has outgrown the old premises, because the old garage has been destroyed by fire or has proved unsatisfactory. But in any case he will want to include in the new structure all the best features which recent experiment and experience have shown to be most valuable.

To do this, the fleet owner will wish to make himself familiar with the best of recent developments and designs, and among these he should by no means overlook the d'Humy Motoramp System.

The d'Humy Motoramp System is an entirely new idea in building construction which offers the usual advantages of the ordinary ramp without its many and obvious disadvantages. It is applicable to garages, warehouses, factories, and, in fact, all types of buildings where vehicular inter-floor transportation is required. It may be used to special advantage in buildings which combine warehouse and garage facilities, and it offers loading and unloading features of unusual interest. Many fleet owners find it desirable to combine garage and warehouse, perhaps using one floor for the

storage of trucks and other floors for carrying stock. The d'Humy Motoramp System is ideally applicable to such a combination.

The basis of the d'Humy idea is the division of the building into two sections, the floors in the two sections being staggered with respect to each other: That is, the floors in one section come half way between the floors in the other section. Because of this simple but radical departure in building design, it is possible to use ramps of half the usual length. The main objection to common ramp types is their size. They take up so much space that they interfere seriously with the efficiency of the layout, and, in addition, the space they actually occupy is often considered so valuable that it is deemed more economical to use elevators, in spite of the extra cost of elevators, the high maintenance charges, and the slowness of inter-floor transportation which the elevator gives.

The d'Humy Motoramp System has a unique advantage over the ordinary type because of its shortness, inasmuch as it can be so located that it is really a substitute for the connecting passageways that would be required in a building of this sort, even if the floors were not staggered. The economy of this ramp is, therefore, due to the fact that it includes the function of connecting passageways.

In addition, as previously mentioned,

its comparative shortness makes it possible to fit the ramp into a building without interfering with the general efficiency of the layout. This cannot be readily done, in most cases, with the ordinary type of ramp because of its length. The latter, in most cases, must be placed at the side of the building and this offers a disadvantage from a layout standpoint and frequently cuts off windows that are necessary.

Furthermore, where the common ramp is used to connect several stories, long passageways across the floors from one ramp to the other must be used. These difficulties are avoided with the new ramp design. The d'Humy ramp may be arranged very compactly at any point along the dividing wall separating the two sections of the building. Ordinarily it is placed in the center this location being equally accessible from all points of the building. Its compactness makes its location just as simple as the location of an elevator. The building may be laid out first and the ramp system located afterwards, whereas with the common ramp all layout considerations must be subordinated to the ramp location.

The d'Humy Ramp may be either single or double as desired, one passage being used for up and down traffic or separate passages for up and down traffic. In the latter case, the inside set of ramps would be used for traffic one way and the outside pair for traffic the other way.

The d'Humy Ramp offers attractive possibilities from an efficiency standpoint in the construction of a combined garage and warehouse. The ramp system makes it readily feasible to run trucks in loading and unloading operations to any floor of the building, and it is believed that in many cases this will greatly reduce the labor necessary, since the goods can be carried via truck directly to the floor where the goods are to be deposited and vice versa. When the truck is to be loaded it may be driven to the floor where the material is or if the goods are scattered among several floors, it may be moved from floor to floor and the various items picked up.

The d'Humy Motoramp System is protected by several patents issued and pending. These are owned by the Ramp Buildings Corporation, 50 Church Street, New York City, whose plan is to sell a license right to any one wishing to use this system. The charge is a nominal one based on the total square feet in the building. In order to utilize the d'Humy Ramp System to best advantage the company maintains a staff of engineers who are ready to aid in producing building layouts incorporating the d'Humy Ramp so that the highest efficiency will be obtained.



*Phantom view of a model big fleet garage equipped with the d'Humy Motoramp System. Note that the floors are staggered and that the ramp is double, one side being for up traffic and the other for down traffic*



# LET'S LEARN TO LIKE IT!

## Old Hammerhead Talks About Work and Success

By SINCLAIR GLUCK

"Truefitt, do you like your work?"

Silas Gunther, president of the town's largest commercial house, leaned back and pressed the tips of his fingers together, while his keen old eyes took in the face and figure of the young mechanic sitting facing him.

"Why—yes, sir," answered the latter after a little pause.

"Good! I'm glad to hear it. But—what do you mean exactly, when you say you like it?"

**G**UNTHER, or Old Hammerhead, as the men called him, had formed a habit of holding little talks with the men of his organization. Most of his associates had come to realize that these talks usually followed a period when they had, consciously or unconsciously, relaxed their grip a little.

Truefitt knew this and his mind flashed back to the previous evening when the Old Man had passed through the garage. He remembered that he had finished a job at 4.30 and had been standing idle when Gunther passed.

"Why—I like repair work, sir. It's—it's my line."

The Old Man nodded. "Yes, it's your line—and most of us follow our inclinations when we choose our lines," he said. "But—did you ever stop to think that there are different ways of liking things?"

The young mechanic looked puzzled. "No, sir," he said at last.

"Yes, there are different ways." Old Hammerhead smiled. "Take reading, for example. A man may say he likes reading. But that doesn't mean that the longer he reads the more he wants to read. In other words, he likes it, but he likes it only for a change. On the other hand, take smoking. Lots of men are so fond of smoking that they couldn't get on without it. If they gave it up they'd feel completely lost. And the more they smoke the more they want to smoke."

The old man paused a moment. "Now I wonder whether that's what you meant? That you like your work so well that the more you do the more you want to do?"

"I—I don't know about that, sir."

Old Hammerhead nodded again. "You know, Truefitt, it's a funny thing the way many of us look at our work. I don't suppose there's a man in this town that wouldn't like to be better off than he is—that wouldn't like to hold a more important and influential and respected position in the community. But how many of them regard their work as a means—as the means—to that end?"

"Let's be logical about this thing," the old man went on. "Men like smoking because it soothes their nerves and because they've acquired a taste for it. It gratifies a desire. But what about work? If a man doesn't work he loses his self-respect. So he goes back to work to soothe his own feelings. And doesn't work gratify a desire, too? Doesn't it gratify ambition? Doesn't it gratify the desire for success?"

"But most of us aren't logical about it, Truefitt. In fact there are mighty few of us that really acquire a taste for work. There are mighty few of us that like work so much that we couldn't do with less of it—that we're continually wanting more of it. And that isn't logical, is it, Truefitt?"

"Then there's another thing," Old Hammerhead went on. "You've probably read stories about the lives of our great business geniuses and statesmen. You've probably wondered how they did it. Maybe you've talked it over with other fellows and come to the conclusion that a lot of those fellows made great successes because they started with more brains and more money than the rest of us. Do you think that, Truefitt?"

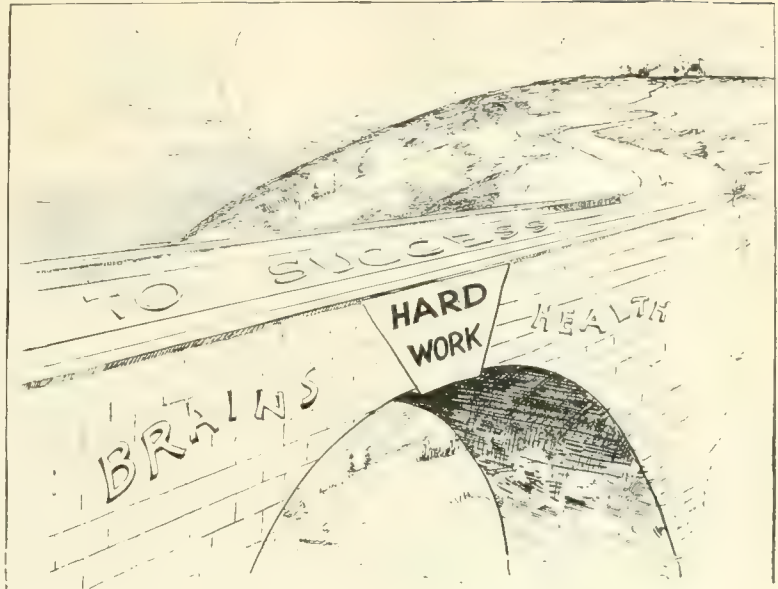
"Why, yes, sir, it looks like it."

### "Work Is the Keystone"

"Maybe it looks like it, Truefitt, but it isn't so. And I'll tell you how you can prove it to yourself. Just stop and realize that there are plenty of fellows who start out in life—thousands of them—with just as much money and just as many brains as the big men had—and who don't get anywhere."

"Then look at the big fellows who started from nothing. Money didn't count there, though of course brains did."

"But neither money nor brains are the real basic reasons for a great success. The reason those big men got where they are is simply that they had a great capacity and a great love for hard work. When other men were finished for the day and off in the pursuit of pleasure, they were off in the pursuit of pleasure



too, but they weren't finished for the day. Because work was their pleasure. Ambition drove them at first, but after a while they acquired a taste for work. They continually wanted more of it. And they got it. Work—hard work—was the keystone of the arch of their success.

"Of course we can't all be great geniuses. We aren't all born with the nerves and the energy and the brains and the constitution to put through that kind of a job. But we can all work some and we can all learn to like it—some form of it—until we want more of it. And that means success. It may be great and it may be less, but it will be success."

"Now," the old man went on after a moment, "there's a perfectly logical reason why a taste for work is the keystone of the arch of success. And this is the reason. If a man does not really like his work, in the sense I mentioned, his heart is not in it. And if his heart is not in it the work is going to be second rate because it's not the best work he can do, nor the most he can do. He's going to neglect his work both as to quality and as to quantity. And that means that other men, who are putting out their best work, are going to get ahead of him."

"Here's another thing. The quantity of a man's work is often a good criterion of the quality. You might think it would be the other way, but a man who works hard and late and turns out a lot of work will do better work in that time than on the days he slacks as to time. Employers know that, Truefitt."

"That's where the question comes down to advancement. Because the employer knows that he can depend on the quality of a man's work when the quantity and the hours are up to standard, showing that the man's heart is in his work. That's the man that the employer picks upon, when the better job wants filling. That's the point, Truefitt!"

"And Truefitt—"

The young mechanic came back through the half-open doorway.

"Interest counts more than overtime—remember that!"



# Rear Axle Repair and Adjustment

*A Series of Articles to Assist Maintenance Superintendents in Carrying on Axle Repairs*

## 8—Walker Bevel-Driven Axle

**T**HE Walker axle is built in three self-contained units: 1—The differential carrier; 2—The axle housing and brake system; and 3—The wheel unit. In this type of axle, the driving power is transmitted at the center in the conventional manner by a bevel drive pinion and gear, both of which are mounted as a self-contained unit with the differential assembly. The power is further transmitted by the driveshafts through the center of the load-carrying member to a spur pinion in the center of each wheel. This pinion floats between the two idler or intermediate gears, which are held in place on roller bearings, between two arms, projecting diametrically opposite from the yokes, with their center-line parallel to the ground. The idler gears, in turn, drive the internal gears, pressed in and bolted solidly to the wheel.

### Lubrication

The bevel driving gears and the differential are lubricated with heavy mineral oil poured into the housing through the filler elbow at the rear. This filler is

### Axles Described in Previous Issues

*Maintenance superintendents who wish to refer to articles on axles that have already been described will find them in the following issues:*

1920

1—Timken.....Nov. 1

2—Clark.....Nov. 15

3—Packard.....Dec. 1

4—Wisconsin...Dec. 15

1921

5—Ford (Bevel)  
Jan. 15

6—Ford (Worm)  
Feb. 1

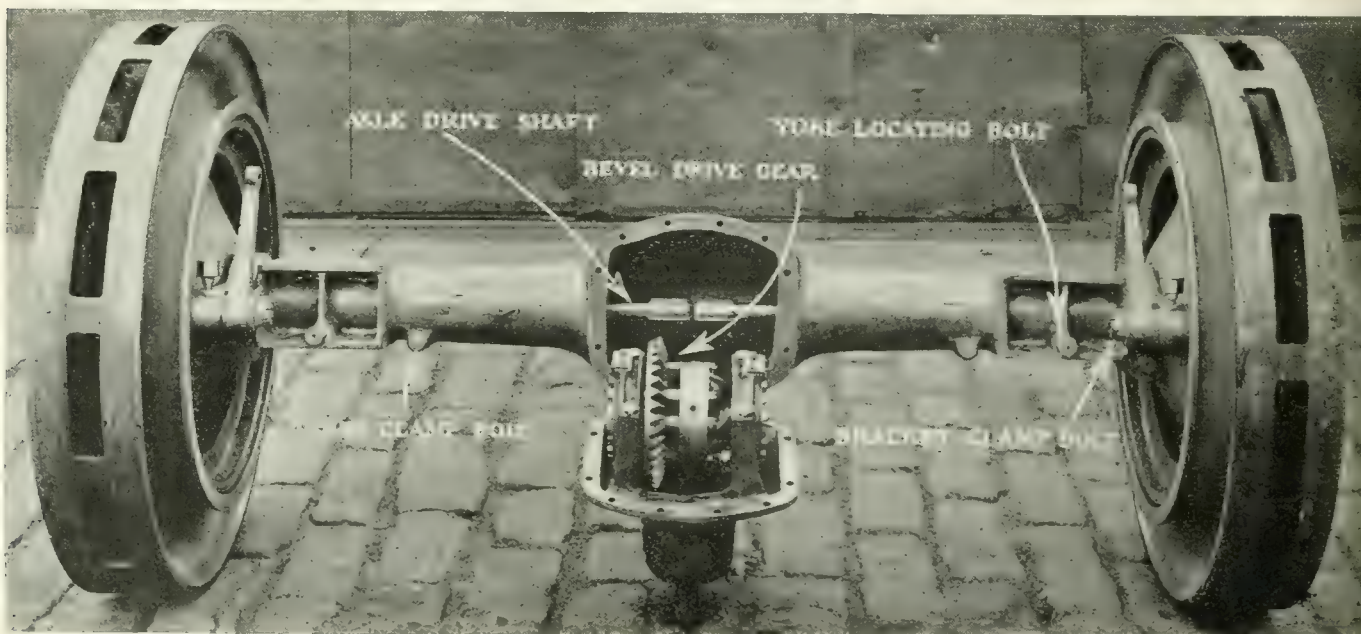
7—Sheldon....Feb. 15

8—Walker...This Issue

located at such a height as to insure the correct oil level.

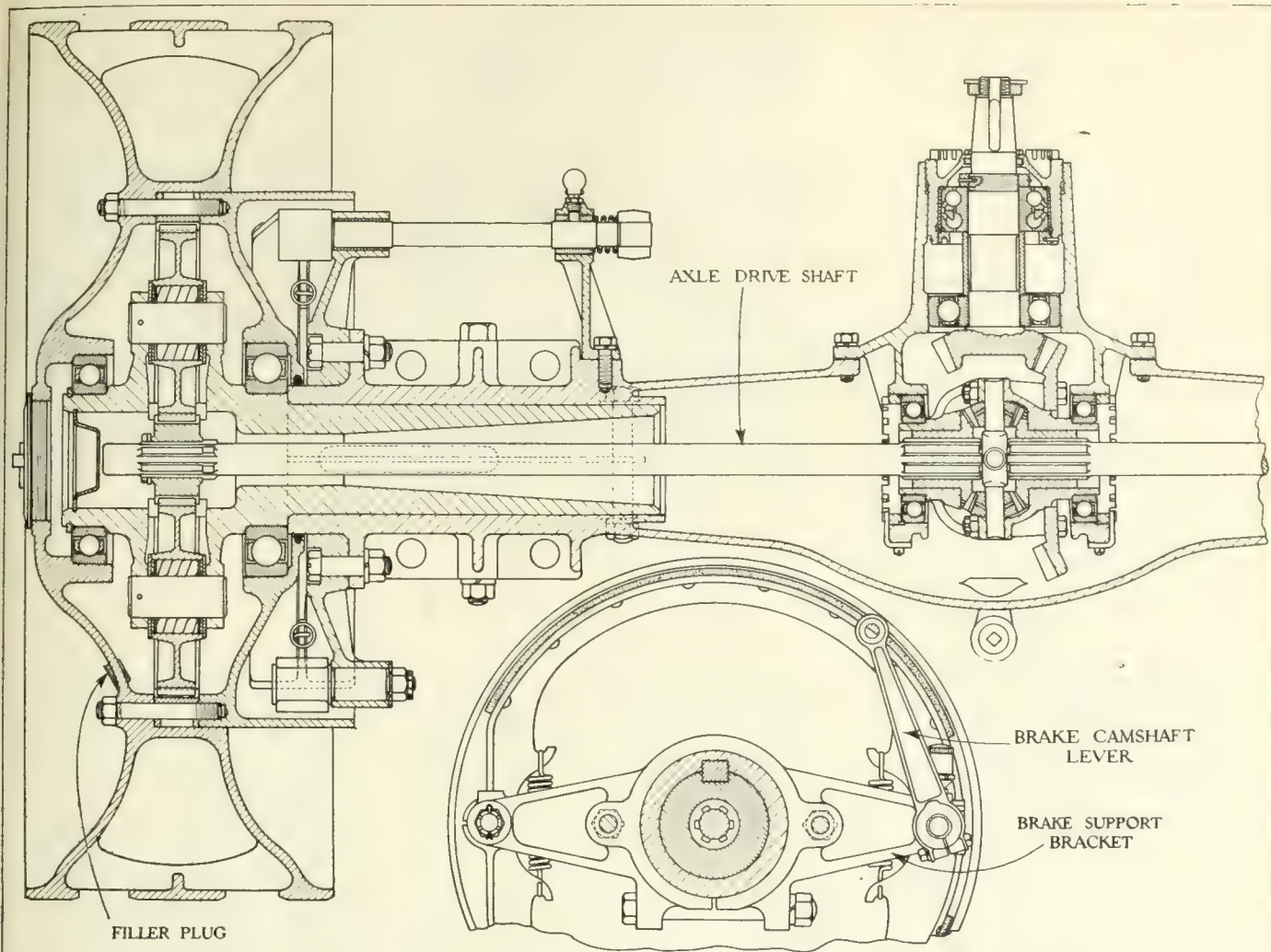
The wheel driving gears and wheel bearings are lubricated with the same kind of oil that is used in the differential. The best method of insuring the proper quantity of oil is to turn the wheel until the plug comes to the bottom and drain completely. Then turn the wheel back and pour in from 1 to 2 pints of new oil. It is easy to determine whether there is sufficient oil in the wheel by removing the filler and drain plug. The approximate proper oil level is one-fourth way between the drain plug (when at its lowest point) and the center of the wheel. Turn the wheel by hand until the drain plug opening intersects the imaginary line to determine if there is an oversupply or undersupply. Too much oil in the hub will result in its working out onto the brakes.

In extremely cold weather, when the heavy mineral oil freezes, it should be thinned down with lighter oil. If the temperature is so low that the engine oil freezes, the axle and wheels should be lubricated with the heavy oil thinned down with just enough kerosene so it will pour like cold molasses at the temperature at which the truck is to be operated.



*The Walker axle, showing the details of its construction and the means for adjusting the wheel brakes*





Sectional view of the Walker axle, showing the differential, driving gears and brake

Oil suitable for lubricating the wheels and the drive gears is sold under such names as "600-W," "600 Steam Cylinder," or "Transmission and Gear Lubricant." Under no circumstances should stiff grease or any solid lubricant of any kind be used.

At the end of the first 1000 miles and after that every 3500 miles, or every 3 months, the old oil should be drained from the rear wheels and from the axle housing, these parts flushed with kerosene, drained well and filled with the proper quantity of fresh oil. The brake camshaft bearings should be lubricated every 300 miles, or every week.

### To Remove a Wheel

To remove a wheel, proceed as follows:

- 1—Jack up the axle.
- 2—Turn the wheel to bring the filler plug to the bottom and drain off the oil.
- 3—Remove the nuts from the studs which hold the wheel and inner hub together.
- 4—Remove the hub cap and screw the wheel puller into place.
- 5—Tighten the wheel puller set screw until it loosens the wheel.
- 6—Remove the wheel by hand.

To remove the wheel yoke, the order of operation is as follows:

- 1—Remove the nut and drive out the yoke locking bolt.
- 2—Loosen the nuts on the inner clamp bolt.
- 3—Loosen the nut on the brake support bracket clamp bolt.
- 4—Drive a wedge into the slot in the bottom of the axle housing. The edge should be inserted about on line with center of spring pad.
- 5—Pull out the yoke.

To remove the axle driveshaft, the

work is done in the following order:

- 1—Unscrew the hub cap.
- 2—Pry out the axle shaft retaining spring.
- 3—Pull out the axle driveshaft.

### Adjusting the Brakes

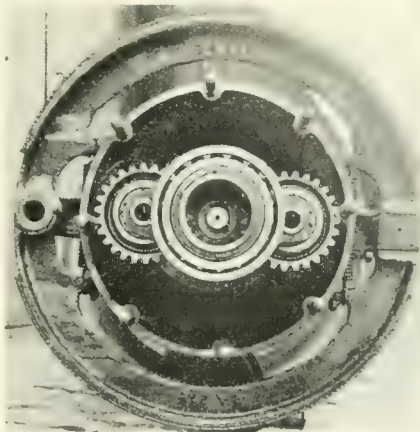
The brake adjustment is taken up in the following order:

- 1—Take up the threaded yokes on the brake rods the same number of turns on both sides.
- 2—When adjustment by means of the rods is no longer effective, loosen the brake camshaft clamp bolt nut.
- 3—Remove the brake camshaft lever from the splined end of the shaft and replace it one or more teeth further back.
- 4—Tighten the clamp bolt nut and re-adjust brake rods to proper length.

Have the brakes at all times so adjusted that they hold equally when applied; that they lock the wheels when fully applied and that they do not drag when released.

### Adjusting Driving Gears

The adjustment of the driving bevel gears is made properly before the axle leaves the factory. If readjustment ever becomes necessary or if a new pinion and gear are installed, the work must be done by a skilled workman ex-



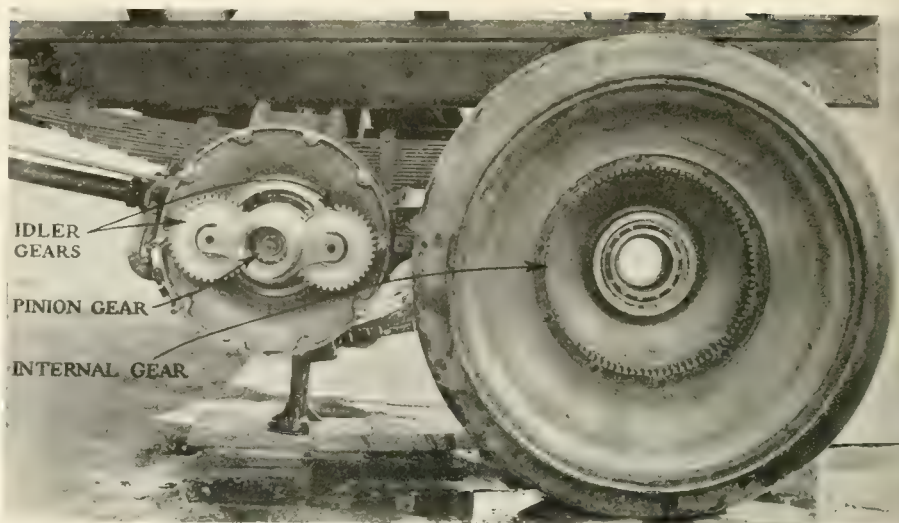
View illustrating the ease of access to the gear chamber in the Walker wheel



perienced in adjusting gears. The pinions and ring gears are sold only in matched pairs which have been properly fitted to each other and tested to run quietly together. Experience has taught that trouble will generally result when an attempt is made to run a new pinion with a worn gear or a new gear with a worn pinion.

### Interchanging the Wheels

The wheel and yoke assembly from one side may be removed and installed on the other side after 15,000 miles, or a year of service, to bring the driving pressure on the opposite faces of the teeth of the gear train. The steps in removing the yoke, as already explained, should be followed except that it is unnecessary to remove the wheel, as the wheel and yoke assembly can be withdrawn together as a unit. The yokes should be coated with heavy oil before they are reinserted in the housing.



*The wheel dismounted on the Walker axle, showing the internal gear which meshes with the idler gears*

## Stop Overloading and You Will Get Longer Tire Life

**O**VERLOADING of trucks is a practice that works at cross purposes so far as effecting economy in operating costs is concerned. To it may be traced many of the breakdowns and premature wearing out of parts, tires, etc. The carrying of an overload to save an extra trip may in isolated instances be warranted, but a succession of these overloads at frequent intervals should never be allowed.

Most premature tire failures are due to overloading; not only to constant overloading, but to momentary overloading as well. Rubber, like any other material, has its limits of resistance, this resistance being its ability to return to its original shape after being compressed. A tire may be compared with an ordinary rubber band, which will snap if stretched beyond its limit of elongation, as the rubber in a motor truck tire will snap at once, even though momentarily loaded beyond its limits of compression. This compression is noticeable by the bulging out of the rubber, both left and right and even front and rear. If the load is within the capacity of the tire the rubber will withstand the strain and as the load is released, will return to its original shape, the same as a rubber band when

stretched and released.

If the tire is overloaded momentarily the rupture may not be apparent, as the broken portions may be hidden by others not noticeably affected, yet the strength of the tire is impaired and failure of the whole structure is merely a matter of a short time, as the damage is bound to spread.

When pneumatic tires are working underinflated, the tires are breaking down abnormally fast and will have to be replaced sooner than should be necessary. The weight of the load pushes in the tread where it comes in contact with the road, flattens it out and so brings a greater surface in contact with the road. This increases wear on the tread. Excessive deflection of the tire causes tread separation, because the tire is flattened and the tread rubber compressed. The resultant working of the rubber between the carcass and the tread rubber produces tread separation. Clincher tires, when under inflated will be subject to rim cuts. Overloading of trucks will produce the above results also, in varying degrees, according to whether the tires are underinflated or fully inflated.

Realizing the effect that premature tire life has on truck maintenance costs,

the Firestone Tire & Rubber Co., Akron, is sending to all truck manufacturers who equip their output with Firestone tires a stock of hand-etched zinc plates, 2 x 5 in. in size, which contain a warning against overloading of trucks.

The warning may be tacked to the cowl of each truck before it leaves the factory. It is in the form of a simple table showing the carrying capacity of pneumatic cord tires of various sizes and the proper inflation for each size. The figures are based on computations made by the Society of Automotive Engineers, New York City.

### At What Stage of Wear Should Solid Tires Be Replaced

**W**HEN should solid rubber tires be replaced? At what stage in their lives is it more economical to provide a new tire than to continue the old ones in service?

That the operator may have some guide as to when it is more advisable to renew equipment than squeeze out more mileage, the B. F. Goodrich Co., Akron, Ohio, issues general rules on replacement. They follow:

If the truck is operated over cobble stone or rough macadam—replace when tires have worn down to within an inch of the steel base.

If truck is operated under favorable conditions—the tires should be replaced when worn to within  $\frac{3}{4}$  of an inch of the steel base. Favorable conditions can be determined as meaning well paved highways, good city streets, and taken at slow speeds.

If the truck is operated under the best possible conditions—under no circumstances allow the tires, even if they have worn down evenly, to go lower than  $\frac{5}{8}$  in. of rubber. This applies only to trucks that operate entirely in cities and at slow speeds over asphalt pavements.

WARNING: FOLLOW THIS TABLE CLOSELY											
CARRYING CAPACITIES OF PNEUMATIC (CORD) TRUCK TIRES											
	5"	6"	7"	8"	9"	10"					
60 LBS.	1400										60 LBS.
70 "	1550	1800									70 "
80 "	1700	2000	2550	3175							80 "
90 "		2200	2775	3450	4000						90 "
100 "			3000	3725	4350	5000					100 "
110 "				4000	4675	5300					110 "
120 "					5000	5650					120 "
130 "						6000					130 "
LAST FIGURE EACH COLUMN S.A.E. MAXIMUM CARRYING CAPACITY											
COMPLIMENTS OF THE FIRESTONE TIRE & RUBBER CO.											

*Carrying capacities of pneumatic cord truck tires*



# The Battle Against Snow

## 12—Weather Reports and Organization

### Advance Information and Plans Speed Up Work

**In This Final Article of the Snow Removal Series Are Explained the Methods and Benefits of Co-operation Between the Weather Bureaus and the Snow Fighting Forces and the Advantages of Advance Plans**

**I**N the last article dealing with the *Battle Against Snow*, an attempt was made to point out the importance of preventive methods against snow drifting in dealing with the highway transportation problem during the winter months.

The preventive methods suggested in that article were of a physical nature, touching as they did upon methods which would prevent the snow from drifting upon the highway.

But there is another feature to the *Battle Against Snow* which might also be listed as a preventive method. This is the system already in vogue in many states for forewarning the snow fighting forces, so that when the snow comes, it will not be able to get too great a lead before the men can get at it.

This system may be divided under two different heads: Weather and road reports, and organization, each of which is of great importance in the battle.

### Weather Reports

It is clear that, if the snow is able to attain considerable depth on the roads before the snow clearing apparatus can get to work on it, the task of the snow fighting forces will be greatly increased and the eventual opening of the road will be that much delayed. But if the snow fighting forces are put to work at once or very soon after the snow attains a depth of, say, 1 inch, it is clear that there must be some method devised for warning these forces that snow is expected even, if possible, before the snow has begun to fall.

Clearly, the only method which will attain this end is a close contact between the United States Weather Bureau stations and the snow fighting forces.

Advance information can always be procured by the State highway department and its divisional engineers in the form of telegraphic reports from the U. S. Weather Bureau stations, which are located throughout the country. This will allow time for the notification to the field organizations and preparation to be made for fighting the snow as it falls and for the final clearing.

These Weather Bureau stations are al-

ready located in forty-two cities in twenty-five different States, so that there should be no difficulty in keeping in close touch with future weather conditions.

In the State of Pennsylvania, this contact has been perfected. The Pennsylvania State Highway Department co-operates to the fullest extent with the United States Weather Bureaus situated at Pittsburgh and at Philadelphia. The Weather Bureaus, having information that a severe snowstorm threatens any particular section of the State, advise the State highway maintenance division and also all the district engineers. Being thus forewarned, the engineers issue in-

structions to the superintendents to have their equipment and forces in readiness to take up the snow removal as soon as the storm begins. The trucks are usually started out after 1 in. of snow has fallen, as it is the belief of the department that to fight snow effectively they must start at the beginning of the storm.

### Road Condition Reports

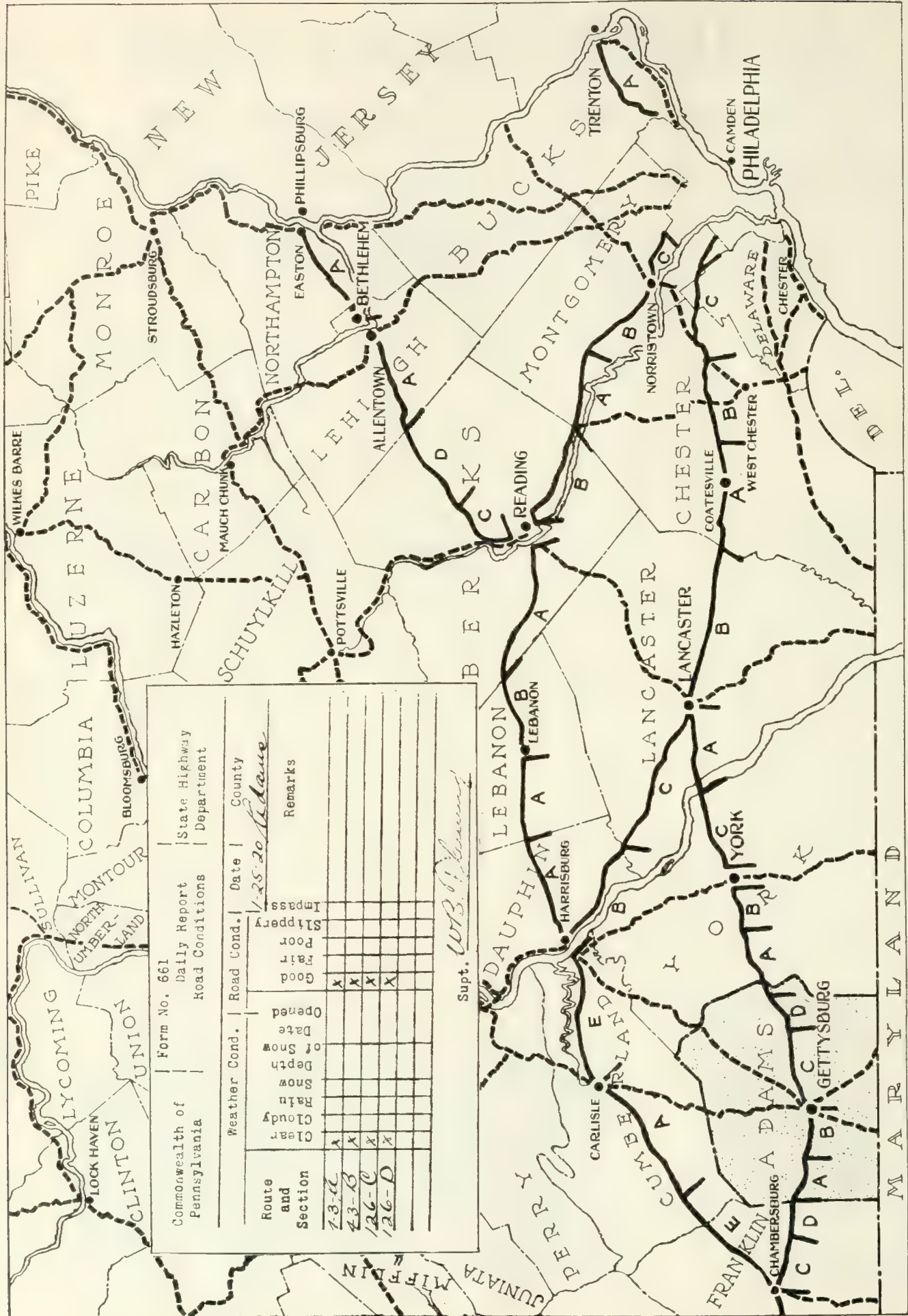
The above system of weather reports is also linked up in several States with a system of road condition reports.

In Pennsylvania, the maintenance division and the weather bureaus are advised daily of road conditions, the depth

U. S. Weather Bureau.		Highway Weather Service in New Jersey.	
County: _____	Town: _____	Date: _____	
CONDITION of HIGHWAYS RESULTING from WEATHER CHANGES at _____ P. M.			
(Mail in time to reach Trenton by 6 A. M.)			
Routes	Improved Roads	Unimproved Roads	Remarks
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Weather: _____		Remarks: _____	
Be sure to report any impassable routes		Use such terms as: Dusty, Sandy, Dry, Very dry, Wet, Very wet, Muddy, Very muddy, Impassable, Light snow, Heavy snow, Drifts, Icy, Slushy	
Signature _____			

Local Office,	U. S. Department of Agriculture,	S. a. m., Tuesday.
Trenton, New Jersey	WEATHER BUREAU. C. F. Marvin, Chief.	February 8, 1921.
<p>Highway Weather Service in New Jersey N. J. State Weather Bureau cooperating</p> <p>The New Jersey Highway Department proposes to keep cleared of snow the main routes, from Jersey City to Butler, from Jersey City to Netcong, and to the south, also from Trenton to Ashbury Park Trenton to Camden, and Camden to Berlin</p> <p>Improved roads are in good condition throughout the State; wet in northwest-ern counties, generally dry elsewhere. Dirt roads are muddy, but passable. Rain or snow is indicated for to-night and Wednesday, slightly colder Wednesday.</p> <p>S. S. S. G. HAROLD NOYES.</p>		

Above are reproductions of sample cards which make up the interlocking system of reports in vogue in New Jersey. The upper card is the report from the county to the Weather Bureau. The lower card is the report from the Weather Bureau to the County Engineer



Pennsylvania State map, showing the counties, the continental highways and the main highways. The card inset in the map is a report on the four sections of cross-continental highway included in the shaded area at the lower part of the map which comprises Adams County. Each numbered section of highway, as shown on the map is a subject of regular report similar to the card inset. Then the sheet on the opposite page includes the data on all the sections. Note that the card inset above has a report on the section included in the first four lines of the sheet on the opposite page



of snow and the weather locally. This report is received at 9 o'clock each morning, which is plenty of time to get the information into the evening papers. By this means all concerned may keep themselves well informed of both present and probable future conditions.

In New Jersey the same principle is carried out by means of a system of post cards of two types.

One of these is a daily card from the Weather Bureau at Trenton, N. J., to the county engineer of each county informing him of the condition of the roads throughout the State, first as to moisture and second as to temperature—that is, whether the roads are frozen, etc.

The card also includes the weather reports for the day and the following night.

The other card is a regular report from all the different districts throughout the State which is forwarded to the weather bureau and from which the weather bureau is enabled to make up the first part of the data mentioned above as being included in the first card.

Reproductions of sample cards of each of these types are shown on page 79.

According to a letter recently received from Garwood Ferguson, County Engineer of Passaic County, N. J., "Each of the twenty-one counties sends in daily reports of the road conditions, detours in use or any other information that might

be of service to the Trenton office, which, coupled with the weather report, enables us to keep fairly good tabs on conditions in general.

## The Fight Against Snow

*Is Being Taken Up in a Series of Twelve Articles in*

THE COMMERCIAL VEHICLE

- 1—Snow Costs Money....Sept. 1
- 2—Clearing City Streets.Sept. 15
- 3—Clearing Country Roads.Oct. 1
- 4—The Fleet Owners' Part.Oct. 15
- 5—The Tools of Battle...Nov. 1
- 6—Pioneers of the City...Nov. 15
- 7—State Highway Work...Dec. 1
- 8—Giant Pneumatics Help.Dec. 15

1921

- 9—Use of the Tractor....Jan. 15
- 10—Weapons of the Future.Feb. 1
- 11—Ounce of Prevention...Feb. 15
- 12—The Weather Man..This Issue

## Snow Is a National Problem

The second preventive principle mentioned above is the organization necessary to permit the snow fighting forces

to get to work without loss of time before or during the commencement of the storm.

For this purpose the organizations of the different states vary in detail but are similar in general plan. For example, the Pennsylvania State highway Division of Maintenance, composed of the assistant engineers, superintendents, foremen, caretakers, labor, etc., assumes complete charge of the snow removal work under the direct supervision of the second deputy commissioner.

Stations are established along the lines of the main highways between the larger towns where motor truck equipment with snow plow attachments, road machines, drags, shovels, etc., are located. The caretakers or patrol men who are regularly employed on the roads are used as a nucleus upon which to collect the forces to handle the work. Systems of reporting are in vogue, by telephone, telegraph and mail, depending upon conditions, to convey to the central office the exact status of work at all times. This information is immediately charted and made available in bulletin form.

In this way the man in command of the whole campaign, being in close touch with the tide of the battle almost from hour to hour, can throw in his reinforcements where they are most needed and when they are most needed. And this is half the battle.

COMMONWEALTH OF PENNSYLVANIA		STATE HIGHWAY DEPARTMENT		DAILY REPORT OF ROAD CONDITIONS		Weather		Conditions		DATE					
						O-Clear Cl-Cloudy R-Raining S-Snowing D-Depth of Snow De-Date open		G-Good P-Poor F-Fair S-Sluggish I-Impossible							
- Lincoln Highway -															
County	Route	Section	From	To	Weather					Condition					Remarks
					C	Cl	B	S	D	De	G	F	S	I	
Adams	43	A	Adams Co. Line - Casketown												
"	43	B	Casketown - Gettysburg												
"	126	C	Gettysburg - New Oxford												
"	126	D	New Oxford - York Co. Line												
York	126	A	York Co. Line - Thomassville												
"	126	B	Thomassville - York												
"	126	C	York - Wrightsville												
Lancaster	126	A	Wrightsville - Lancaster												
"	215	B	Lancaster - Chester Co. Line												
Chester	142	A	Chester Co. Line - Downingtown												
"	142	B	Downingtown - Malvern												
"	142	C	Malvern - Montgomery Co. Line												
Bucks	281		Phila. Co. Line - Morrisville												
Chambersburg to Harrisburg															
Franklin	35	A	Chambersburg - Camb. Co. Line												
Cumberland	35	A	Cumberland Co. Line - Carlisle												
"	34	E	Carlisle - Harrisburg												
- William Penn Highway -															
Dauphin	139	A	Harrisburg - Lebanon Co. Line												
Lebanon	139	A	Lebanon Co. Line - Lebanon												
"	149	B	Lebanon - Berke Co. Line												
Berke	149	A	Berke Co. Line - Reading												
"	146	B	Reading - Montgomery Co. Line												
Montgomery	146	A	Montgomery Co. Line - Limerick												
"	146	B	Limerick - Norristown												
"	145	C	Norristown - Phila. Co. Line												
Berke	157	C	Reading - Kirbyville												
"	157	D	Kirbyville - Lehigh Co. Line												
Lehigh	157	A	Lehigh Co. Line - Bethlehem												
Northampton	159	A	Bethlehem - Easton												
- Harrisburg to Lancaster -															
Dauphin	129	B	Harrisburg - Lancaster Co. Line												
Lancaster	129	C	Lancaster Co. Line - Lancaster												

This is the Pennsylvania State Highway Department form on which is collected the information contained in the different reports on road conditions on the main highways throughout the State. One of the reports from which this sheet is made up is shown on the opposite page, inset

# Lower Coal Delivery Costs with Special Bodies

**Loading and Unloading Time Is Big Factor in Delivery Cost. How One Company Reduced Cost to 92 Cents per Ton with a Vertical Lift Body with Side and Rear Discharge**

**I**N delivering retail coal with motor trucks, the ultimate cost of delivery per ton or per ton-mile is largely governed by the unloading facilities at the point of delivery. The reason for this is simple. The coal merchant, by installing efficient hoppers for loading his trucks, can cut down to a minimum the time taken in loading. But he cannot himself insure unloading facilities such as a direct dump into the coal hole at the point of delivery. Therefore he is at the mercy of such lack of facilities, because the time taken by his trucks in unloading will be greatly increased, and this will increase his cost of delivery.

However, there are some steps that he can take to mitigate this condition. For he can equip his trucks with dump bodies which will be ideally adapted to take care of good unloading facilities when these are present, while at the same time they are adapted to make the best possible speed of unloading under the circumstances where good unloading facilities are not present. The employment of trucks of the correct capacity will also help matters.

How this works out in practice and how delivery costs may still be kept at a low figure in spite of the lack of local unloading facilities is shown by the ex-

perience of John Whittemore's Sons Coal Co., Boston, Mass.

The Whittemore company operates several coal yards in different parts of Boston and makes deliveries to all parts of Boston, Cambridge, Dorchester and

## What the System Costs

*On opposite page is shown a filled-in sample sheet of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.*

other suburbs. The greater part of the company's retail trade consists of small orders delivered to private residences, where it must be carried into the basements. This makes the cost of delivery very much higher than it would be in

the case of deliveries in large quantities, where the coal could be dumped direct into the coal hole.

The company owns and operates three Selden trucks—two 2-tonners and one 2½-tonner. The 2½-tonner is the newest, having been in operation for about 10 months. During the first 6 months of this time—April 1, 1920, to Sept. 30, 1920—the average daily delivery of the truck amounted to 18 tons, and it averaged 6 trips a day in delivering this amount.

This in itself is a very fair average in the work of retail delivery and shows that the truck was efficiently handled and stood up to its work well. But on one of the days included in this period, the truck actually delivered 36 tons of coal in 8 hours, making 12 trips to do it. This is an exceptional record, because the deliveries on that day were under exceptionally favorable conditions as regards lengths of runs and unloading facilities. But it goes to show what a truck is capable of, under such favorable conditions.

As time lost in loading and unloading is such an important factor in the ultimate delivery cost, all this company's coal yards are equipped with overhead hoppers, so that the trucks can load in a very few minutes. But in addition, the Selden has a vertical lift body, with side and rear discharge, well adapted to rapid unloading under all conditions; and this body plays no small part in keeping the cost of delivery down to a reasonable figure.

## Body Helps Save Time

It is interesting to note how this type of body adapts itself to different conditions. If there is plenty of maneuvering space in the street in front of the coal hole and the hole is sufficiently close to the curb so that a chute can be extended from the bottom of the body to the coal hole, the truck is backed against the curb in the manner shown in the left hand illustration on page 83. On the other hand, if there is little maneuvering space in the street, the truck is run alongside the curb and the chute which connects the bottom of the body with the coal hole is run out at the side, in the manner shown on this page.

But where the coal hole cannot be reached with a chute running from the bottom of the body, the construction of



*Delivering coal in a narrow street. The special dump body here dumps at the side down a long chute direct to the coal hole. The process is rapid and saves running time for the truck*



## The Commercial Vehicle—Truck Cost System

6 Month ending Sept. 30 1920Make of truck SeldenGasoline Motor

U. S. C. BOOK COMPANY, INC.

243 245 WEST 30th ST. NEW YORK 18

## Operating Charges

Gasoline	1200	gals	@ .31	\$ 372 00
Current		kw h	@ .02	
Oil	150	qts	@ .15	22 50
Grease		lbs	@ .05	
Kerosene		gals	@ .05	
Waste		lbs	@ .05	
Dish Water		gals	@ .05	

Driver	150	days	@ \$5.72	858 00
Helper		days	@ .00	

A-Total Operating Charges 1252.50

## Maintenance Charges

Tires	6569 miles	@ 10,000 mile life	\$ 172 11
Repairs			
Overhauling painting, etc.	Estimated		150 00
Spare vehicle rental			
Vintage rental (pro rata)	@ \$20 per month		120 00

B-Total maintenance charges 442.11

## Fixed Charges

Insurance fire	131.80	per year	\$ 65 90
Liability		per year	
Collision		per year	
Interest	6%	(On Item 1-10)	146 77
Depreciation on chassis			
Depreciation on body	\$55,000 mile life		553 11
Depreciation on equipment			
Depreciation on tires			
Total taxes and licenses	@ \$30 per year		15 00

C-Total fixed charges 780.78

\*Note: Omit one of these

## The Commercial Vehicle—Truck Cost System

Number of Truck 3Capacity in lbs 5000Chassis No. 

U. S. C. BOOK COMPANY, INC.

243 245 WEST 30th ST. NEW YORK 18

## Investment

Cost of chassis, motor, etc.	
Cost of body	4 630 08
Cost of equipment	
Cost of tires	262 30
Total cost complete	4 892 38

## Performance Record

1. Chassis operated	50
2. Days idle	33
3. Days maintained (Item 2 ÷ Item 1)	.83
4. Total hours operated	1250
5. Total miles covered	6569
6. Total trips made	@ 10 trips per day 900
7. Total tons of packages or cargo	2750

## Performance Averages

8. Average miles per day maintained (Item 3 ÷ Item 4)	35.9
9. Average miles per day operated (Item 5 ÷ Item 4)	43.8
10. Average miles per trip (Item 5 ÷ Item 6)	7.3
11. Average tons of packages or cargo per trip (Item 7 ÷ Item 6)	3
12. Average commercial ton miles (Item 7 x Item 11)	10.95

## Recapitulation

13. Total expenses for month (Sum of Items A, B and C)	\$ 2475.39
14. Cost per day operated (Item 13 ÷ Item 4)	16.50
15. Cost per day maintained (Item 13 ÷ Item 3)	13.53
16. Cost per mile operated (Item 13 ÷ Item 5)	.377
17. Total commercial ton miles (Item 7 x Item 11)	9855
18. Cost per commercial ton mile (package miles or stop miles) (Item 13 ÷ Item 17)	.251
19. Cost per ton hauled (Item 14 ÷ Item 8)	\$ 9.17

The cost figures on the 2½-ton Selden for a period of 6 months, laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. The final costs of 25 cents per ton-mile and 92 cents per ton are low for this type of retail coal delivery

the body still facilitates unloading to the greatest degree possible. In this case the coal must be carried into the basement in bags, but the body is so constructed that it will dump straight into the bags held by the men making deliveries, which saves a second handling of the coal during the unloading process. This is shown in the illustration at the right on this page. Of course, in certain instances it may prove more economical to dump the coal on the sidewalk and leave men to carry it into the basement,

while the truck goes on its way to another delivery. But where this is possible, the type of body could have no possible influence on delivery time so long as it was a dump body.

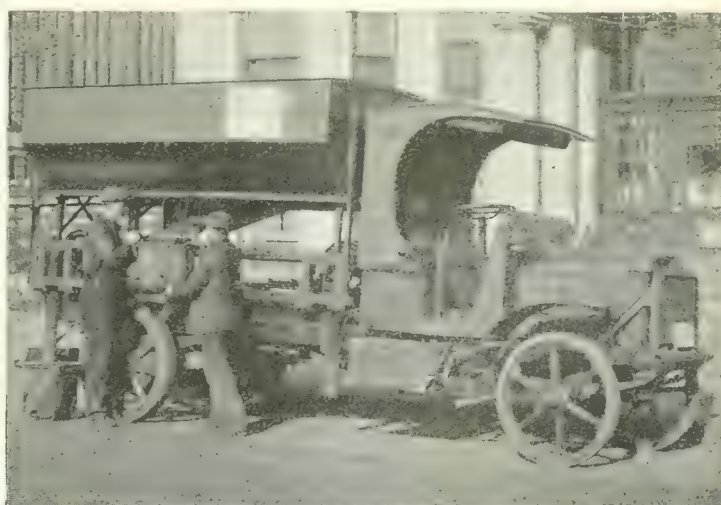
As regards the capacity of the truck, the company's experience has been that the 2½-ton Selden is ideal for this work. This is true because, while the 18 tons of coal daily is an ordinary day's work for the 2½-tonner, it would be too much for a 1½- or 2-tonner and the use of the latter would send up the delivery

cost almost 30 per cent, as estimated by the company.

The actual operating costs for the 2½-tonner for the period of 6 months ending September 30 are shown at the top of this page, laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. These figures are reproduced through the courtesy of the Selden Truck Transportation and show some interesting facts on the cost of this type of coal delivery.



Where the street is wide and the coal hole accessible placing the chute at the rear speeds up delivery



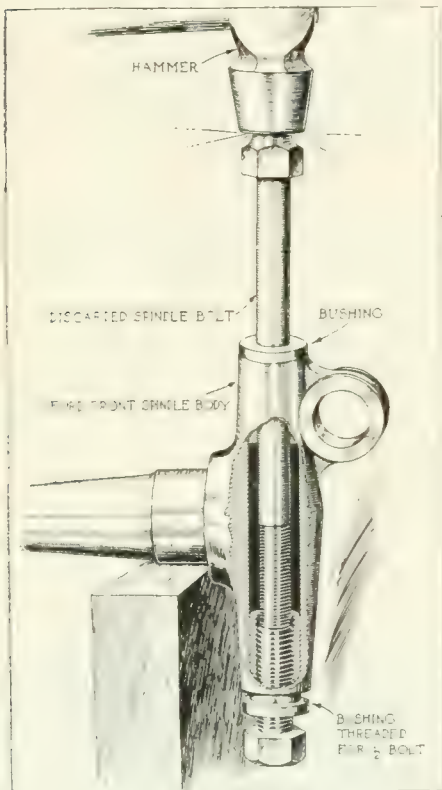
In this case the coal hole cannot be reached by chute. But the side delivery into baskets speeds up delivery by hand

# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 388—To Remove Ford Spindle Bushing

HERE is another method to remove a Ford spindle body bushing, always a somewhat difficult operation, because a tool large enough to drive out the bushing would be too large to pass through the opposite bushing, if the latter is in place. The method suggested here and shown in the accompanying illustration is as follows: The bushing to be removed is first tapped out with  $\frac{1}{2}$  in. U. S. thread or  $\frac{3}{8}$  in. pipe tap so that it will



No. 388—Spindle Bushing

take a  $\frac{1}{2}$  in. bolt, cap screw or pipe plug. This plug or bolt is then screwed into the bushing and serves as a surface for a tool which would otherwise pass through the bushing. When the bolt is screwed into the bushing, bolt and bushing can be tapped out by means of a discarded spindle bolt, as shown in the illustration.—H. E. MARSDEN, Detroit.

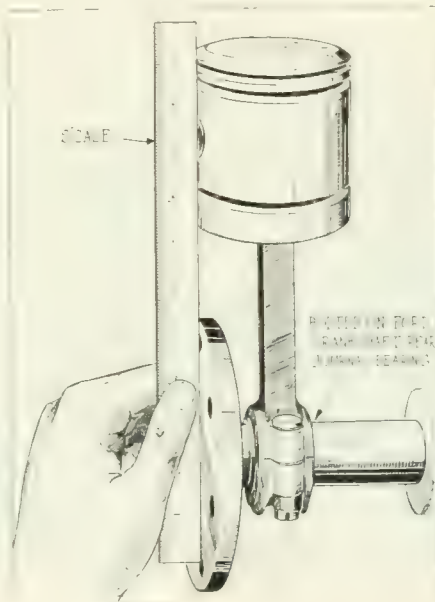
## No. 389—Alignment Jig for Ford Connecting Rod

IF the trucks are to be kept at their highest efficiency it often becomes necessary in shop practice to test the

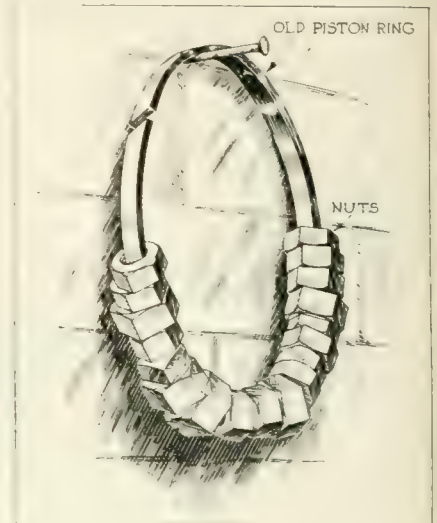
*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

alignment of one or more connecting rods after the engine has been disassembled for repair. However slight the misalignment may be, it will cause a disproportion-



No. 389—Alignment Jig



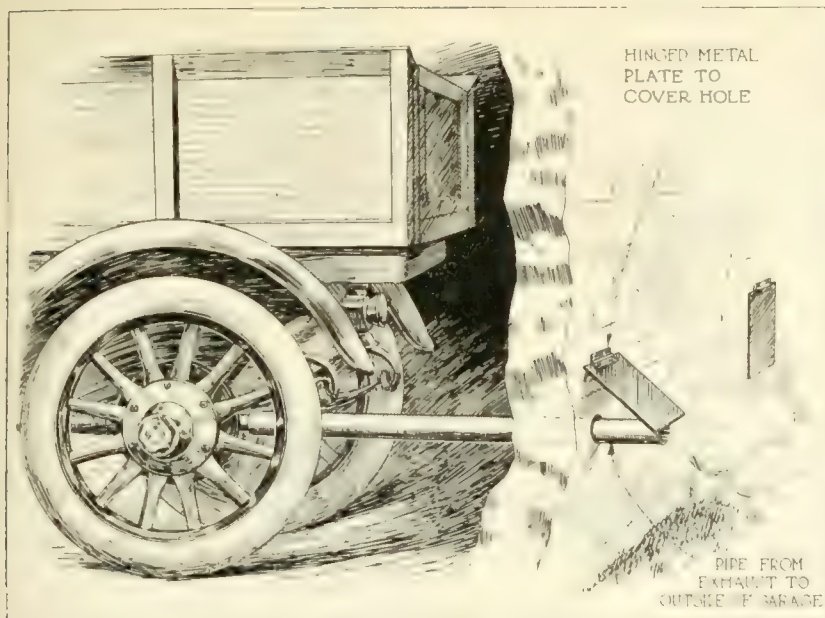
No. 390—For Nuts

tionate amount of wear on the running parts and a good mechanic will always test the alignment of the connecting rods before assembling the engine. However, a special jig for this purpose is not always available. When this is the case the connecting rod assembled together with the pistons may be mounted on the rear bearing of the crankshaft in the manner shown. A rule or scale placed against the skirt of the piston and against the crankshaft flange for attachment to the flywheel will then show whether or not the connecting rod is in perfect alignment.—H. R. MILLER, Auto Inn Garage, Eustis, Fla.

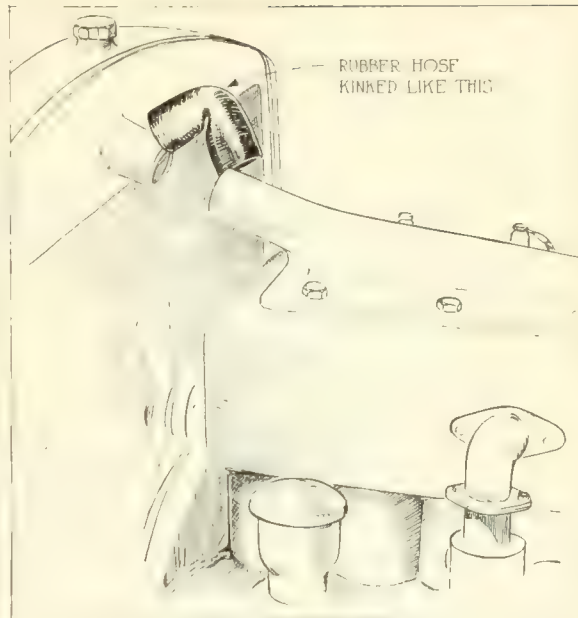
## No. 390—Good Shop Use for Old Piston Rings

AS the accompanying illustration indicates, an old piston ring can still prove of use and convenience in the repair shop, even although it has outworn its usefulness on the piston. If a nail is driven into the wall immediately above the workbench and a number of bolts of the size in most common use are threaded onto the piston ring, the latter can be hung up in plain sight. Thus, when the mechanic wants a bolt of that size he can reach up and take one off the ring without hunting all over the workbench for it. The spring in the piston ring and the fact that it is split makes it ideally adapted for a purpose of this sort, on the same principle as a key ring. M. S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.





No. 391—For Healthier Conditions



No. 392—Kink Hose

### No. 391—Keep Garage Clear of Exhaust Gases

**E**VEN in a well-ventilated garage especially if the greater part of the storage space is used for vehicles, there will be a great deal of exhaust gas given off by the vehicles starting in the morning or pulling into their places at night and racing their engines for a moment before switching off. Moreover, when repairs are carried out in the garage it is sometimes necessary to run in an engine which has been supplied with new bearings, until these bearings are working smoothly and without undue friction. The danger from exhaust gases is now generally recognized, the percentage of monoxide gas contained in it being extremely deadly. The accompanying illustration indicates a method already in use to avoid danger from this gas. Holes are provided in the walls back of each truck. Through this hole a pipe is passed, one end of which fits over the exhaust pipe on the truck. This pipe carries the exhaust gases into the open air outside the garage. A hinged metal cover which closes by its own weight is provided to cover the hole when the corresponding truck is out of the garage.—C. J. BRINKLEY, Chicago.

### No. 392—How to Replace Radiator Hose

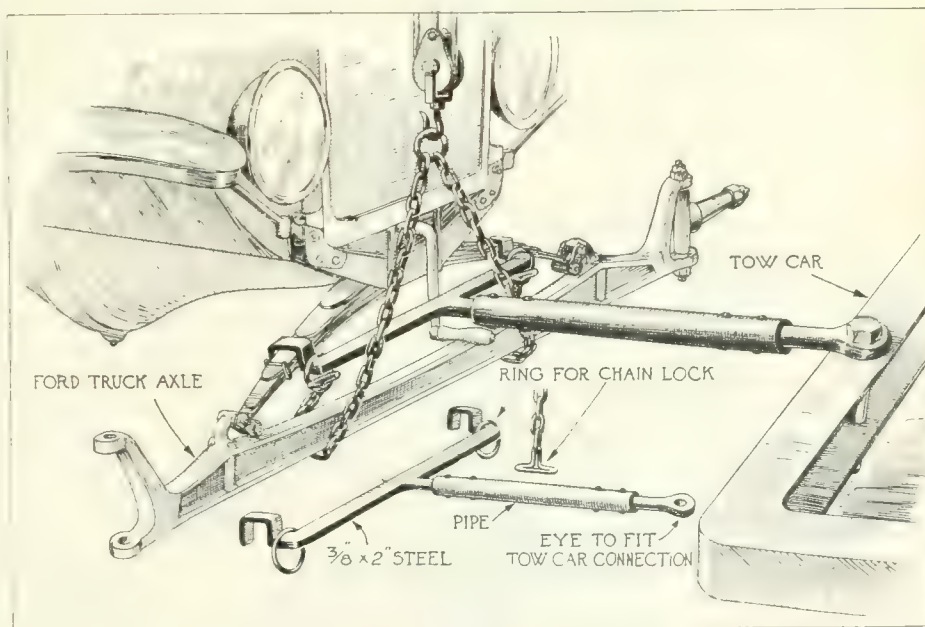
**W**HEN a leak develops in the upper water connection joint between the radiator and the engine it is sometimes necessary to remove the joint altogether and replace it with a new one. Or when the radiator has been removed and replaced it may also be necessary to replace the water joint altogether after the radiator is replaced. When the water outlet on the engine and the radiator inlet are very close together this is sometimes difficult because the rubber connection is so much longer than the space between the outlet and inlet. When this

is the case the hose can be slipped on quite easily if it is kinked and applied to the two connections in the manner shown in the accompanying illustration. It can then be pushed and worked into place very readily.—FRANK L. ERDMANN, St. Charles, Mich.

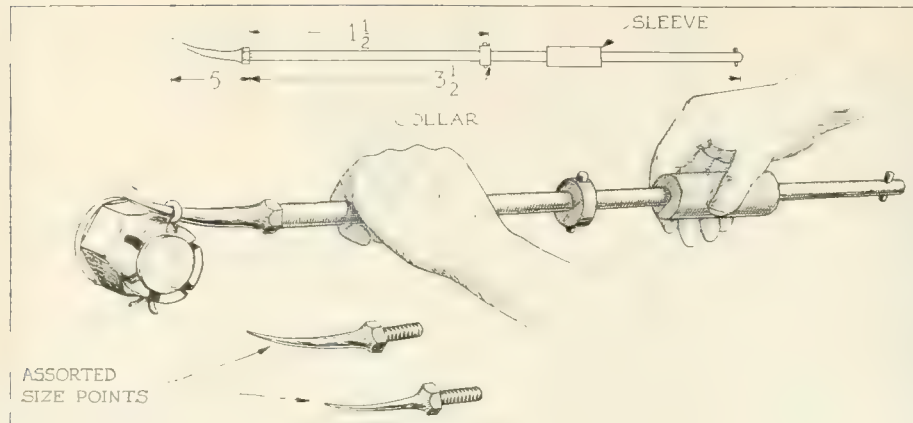
### No. 393—Handy Tow-Bar for a Disabled Truck

**T**HE accompanying illustration shows a useful and convenient tow-bar for bringing in a Ford truck with a disabled front end. It is used with a repair car equipped with a hoist at the rear and makes it unnecessary to steer the disabled truck when the latter is being towed back to the garage. The tow-bar is made of  $\frac{3}{8}$  in. by 2 in. steel and is attached to a piece of  $1\frac{1}{4}$  in. gas pipe.

This in turn has an eye to attach it to the rear of the tow car. A chain of the double type is used with a ring in the center for the hook in the hoist chain or block tackle. Each end of the chain has a T-shaped link which can be passed through rings on the bar so as to lock in them. The chain is passed down to the rear of the front axle and then passed up in front of the axle and attached to the chain hoist. The chain hoist is used to raise the Ford truck until the front wheels are clear of the road. The chain, passing under the front axle, holds the tow pole firmly to the Ford spring. The towing device thus serves two purposes: It hoists up the front end of the Ford clear of the ground and also prevents the Ford truck from bumping into the towing car.—GEORGE HERON, The Boston Store, Chicago.



No. 393—Hoist and Tow Combined



No. 394—Cotter Pin Tool

### No. 394—Cotter Pin Removing Tool

THE accompanying illustration shows a useful little tool especially designed for removing cotter pins. When disassembling a part, the castellated nuts on which are locked with a number of cotter pins, every mechanic knows the amount of time which is wasted in removing the cotter pins, it being necessary first to bend the ends together and then to pull out the cotter pins by means of pliers. This little tool like most shop conveniences of its class is designed to save time in this operation. The tool is made of a single section of rod bored and tapped at the end to receive different sizes of spiked heads for different sizes of cotter pins. Small collar is shrunk or welded onto the middle of the rod and a heavy sleeve placed on the upper end of the rod and designed to play between the handle end of the rod and this collar. The illustration indicates the manner in which the sleeve is used to force the point of the tool into the head of the cotter

pin and pry it out. When the sleeve is brought down hard against the collar, the cotter pin is removed.—A. J. FAUST, Springfield, Mass.

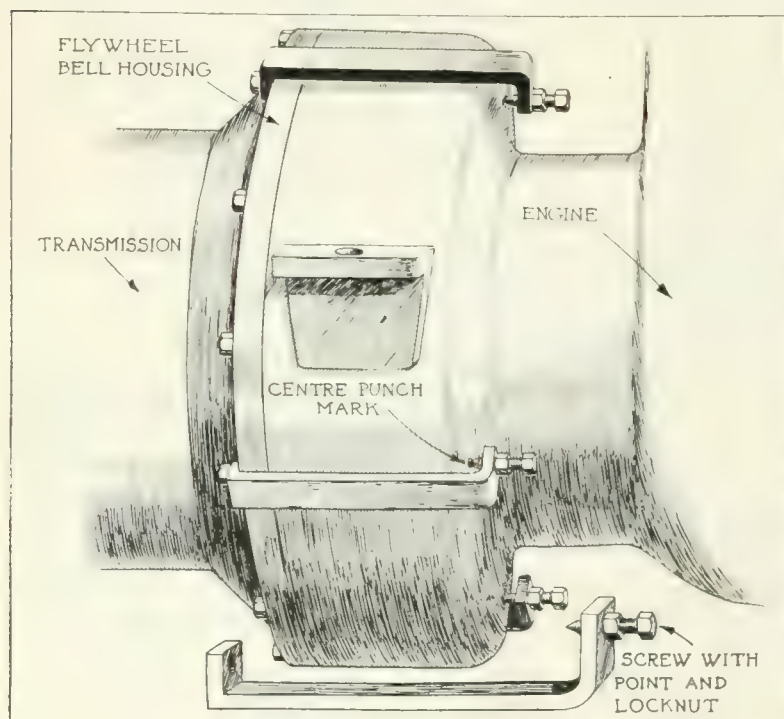
### No. 395—To Hold Gearset Cover to Bell Housing

TRANSMISSIONS of the unit power-plant type sometimes work loose from the bell housing of the motor and this often causes the threads in the bolt holes in the housing to strip. This condition may be avoided by means of four clamps; two placed at the top and two at the bottom, as shown in the illustration. These clamps will hold the transmission firmly to bell housing. The clamps are made of  $\frac{3}{8}$  in. by 2 in. stock and one end is bent long enough so that a hole bored in it will match the hole in the transmission supporting flange. The other ends of the clamps are also bent and bored to hold a  $\frac{1}{4}$  in. bolt. This bolt is filed to a point. The bell housing is center punched in four places to receive the points of the four bolts. This

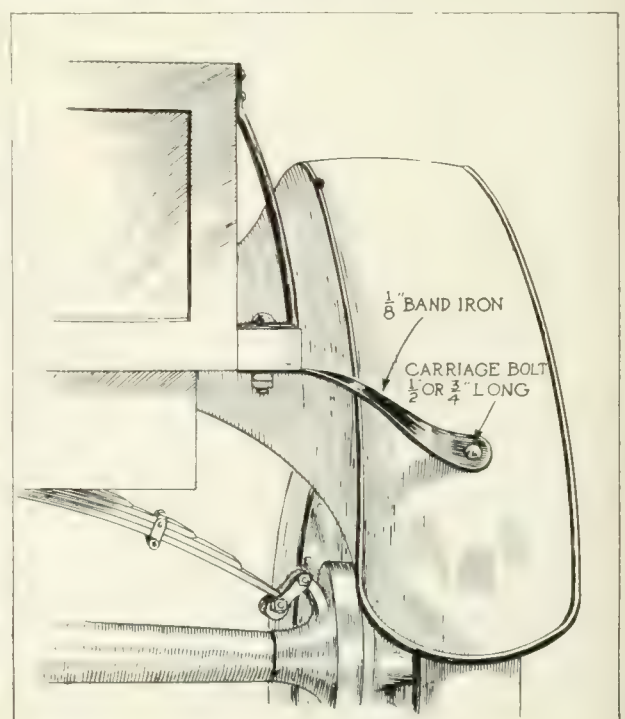
is to prevent the clamps from slipping. Unscrewing the four pointed bolts after the bolts in the transmission have been removed will give ample room to slip off the clamps if desired. The four pointed bolts should be supplied with lock nuts between the clamp and the head bolt so that when the pointed bolts are screwed tight into the center punched holes the bolts can be locked in position. This device will be found to work on small powerplants as well as large.—GEORGE HERON, The Boston Store, Chicago.

### No. 396—Inexpensive Way to Brace Ford Fenders

IN a recent issue of THE COMMERCIAL VEHICLE there was published a short-cut showing a method to brace Ford fenders by means of a piece of strap iron bolted to the lower part of the body and underneath the fenders. This was short-cut No. 295 in the issue of November 1. Exception has been taken to this method by a contributor on the grounds of the expense involved with this brace. As an alternative he suggests the following method: Remove the nuts on the extreme rear corners of the body. Use 1 in. by  $\frac{1}{8}$  in. band iron long enough to reach from these corner bolts to the center of the fender, drill holes in the ends and twist the band iron so that the ends lie flat against the top of the fender and flat against the under side of the rear sill, as shown in the accompanying illustration. One end of each section of band iron is then slipped over each of the rear sill bolts and the nuts replaced. The other end of each band iron is fastened to the center of the fender by means of a  $\frac{1}{2}$  in. or  $\frac{3}{4}$  in. carriage bolt. This makes a very rigid support for the rear fender when used in connection with regular Ford fender brackets.—W. H. ROEH-RIG, Ford Repair Shop, Utica, N. Y.

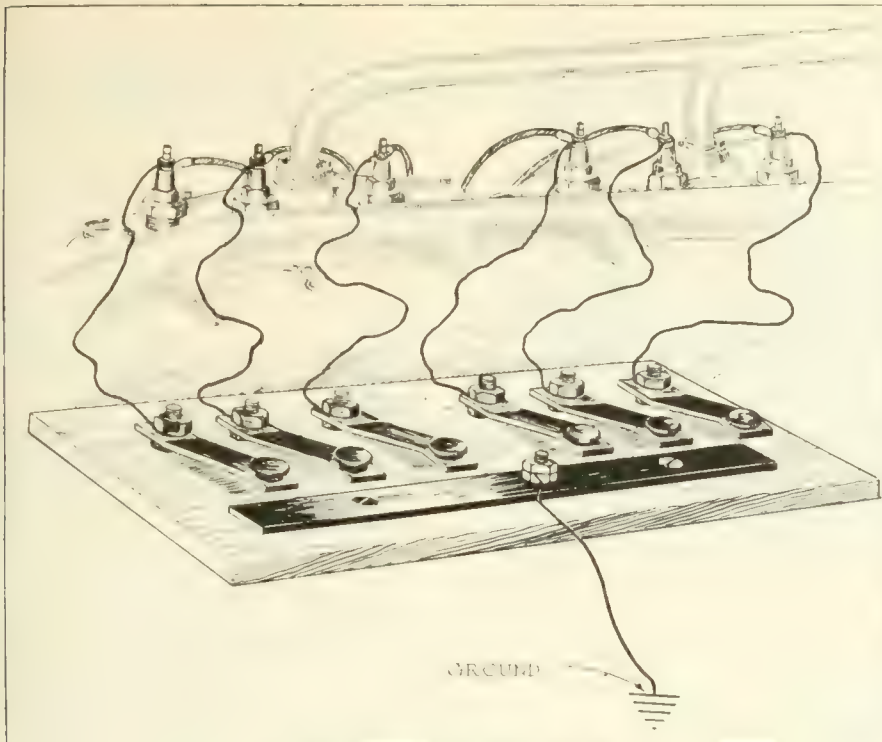


No. 395—Flywheel Housing Clamps



No. 396—Fender Brace





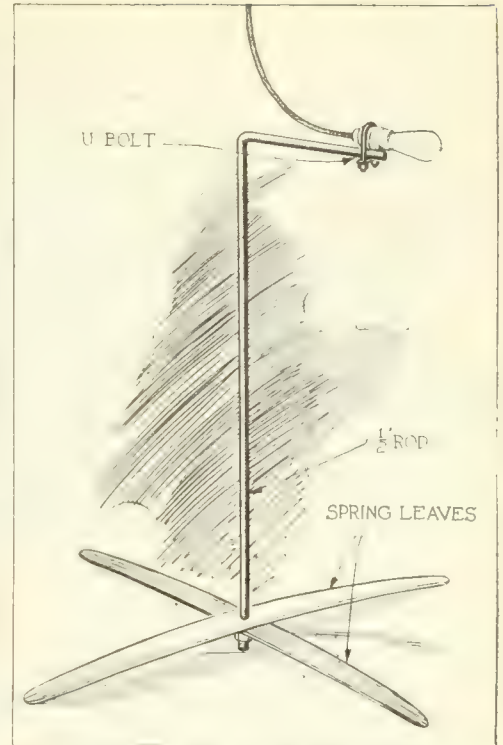
No. 397—Spark Plug Tester

### No. 397—Handy Repairshop Spark Plug Tester

THE device shown in the accompanying illustration is a spark plug tester for use either in the garage repairshop or on the road, when difficulty is experienced with missing in one of the cylinders. The device is designed for testing each plug on the engine individually by means of the keys shown. With it any plug may be short-circuited independently of the others. As the illustration shows, the plugs are connected with the different keys on the board and the contact plate on which the keys make contact is grounded. The board shown in the illustration is designed for a six-cylinder engine so that it will be of use when a Rock Falls or Avery truck is used, but the device is equally serviceable in the case of a four-cylinder engine, only four of the keys, however, being used in this case.—CHARLIE HOWELL, Brayton Motor Co., Pueblo, Colo.

### No. 398—Garage Stand for Drop Light

IN the accompanying illustration is shown a useful and inexpensive little device for holding the drop light either when working on the truck itself for repairs or washing or for working on some of the larger parts mounted on an engine stand. The base of the stand is made from a couple of old spring leaves joined together at their centers. If Ford spring leaves are used the original bolt holes may be used for this purpose. The junction is made by means of a rod which also serves as the upright to hold the lamp. This rod is bent at the top at right angles and the light bolted to the end of this section by means of a U-bolt



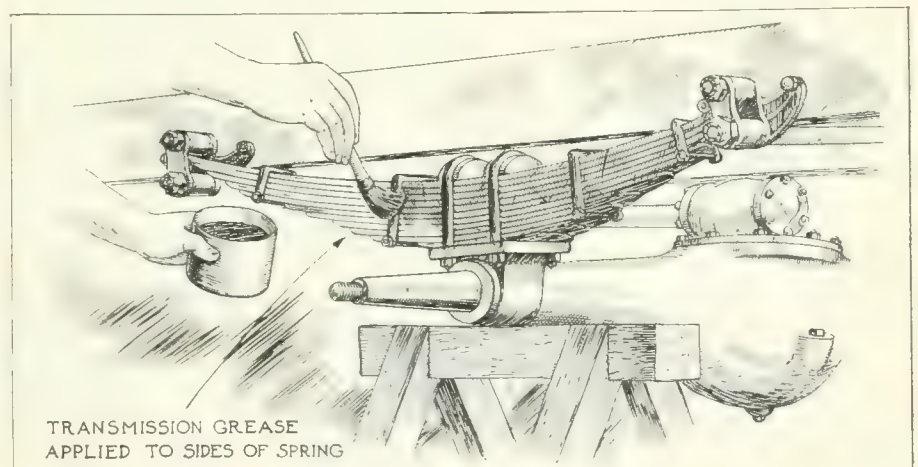
No. 398—Light Stand

as shown. The length of the upright section of the lamp stand may be varied according to the purpose for which it is required. The upright rod may be made from a  $\frac{1}{2}$  in. rod. If the leaves thus bolted together to form the base show a tendency to close like the blades of a scissors so that the lamp falls over, a piece of cord may be woven in and out around the blades at their junction which will prevent this.—H. R. MILLER, Auto Inn Garage, Eustis, Fla.

### No. 399—For Better Truck Spring Service

THE springs of a truck are very often neglected so far as lubrication is concerned. As a result they get very dirty and rusty. This means that the springs will ride stiffly, as can be readily seen because they squeak. This condition is bad enough in itself, but it often

means also that the spring leaves will break in cold weather on even the lightest of road bumps. To remove the entire spring and loosen the clips would take time, while to separate the spring leaves entirely would take still more time and would be out of the question from an efficiency point of view. However, the difficulty may be overcome by lubrication accomplished in another way, which takes but little time and will accomplish the desired result. To lubricate the springs, brush the dust and rust off the sides and clean these with a little kerosene. Then, with a clean brush, apply a coat of old oil from the crankcase or, better, transmission grease, to the sides of the springs. When the truck is in motion, the spring action will cause the oil or grease to work in between the spring leaves, resulting in much greater efficiency in the springs.—WALTER F. DAASCH, Davenport, Iowa.



No. 399—Preserves Springs

# Larger Engine in New 5-ton Standard

*Is Longer and Has Greater Traction  
for All Kinds of Road Building Work*

THE new Model 5-K, 5-ton Standard made by the Standard Motor Truck Co., Detroit, is longer, heavier, more powerful and has greater traction. It is designed to meet the demand created by contractors for a truck with ample power and traction to pull peak loads out of excavation jobs, and to negotiate all kinds of road building work.

It is powered by the new, low-speed, heavy-duty Continental B-2 engine. This new power-plant has an S. A. E. rating of 36 1/10 hp. and 48 hp. at 1000 r.p.m. This compares with 32.4 hp., S.A.E., rating, and 39 hp. at 1000 r.p.m. in the former model.

The crankshaft bearings in the new engine are proportionately larger. Where the front bearing was 2 13/16 in., by 3, it is now 2 3/4 by 3 in. The center bearing which was 2 7/32 in. by 3 1/4, is now 2 1/2 by 4 in. The rear bearing, which was 2 1/4 in. by 4 15/16 in., is now 2 1/4 by 4 in. The pistons are considerably longer, being 6 3/8 in. instead of 5 3/8 in. The bore and stroke which were 4 1/2 in. by 5 1/2 are now 4 3/4 by 6.

Other features are the built-in governor; 1 1/2-in. carbureter instead of 1 1/4-in.; larger universal joints; provision made for installing generator for lighting system; heavier frame and longer wheelbase. This wheelbase which was 116 in. is now 164 1/2 in. The new Standard is 600 lb. heavier than the old model, the weight being 8700 lb.

The cylinders are cast in pairs and the covers entirely enclose the valve mechanism. The water jackets are of ample size particularly at the valve seats to prevent valve burning. The valves are of alloy steel to resist warping, the clear diameter under the seat being 2 3/8 in.

Complete valve timing is stamped into the flywheel rim, the flywheel being bolted to a flange at the rear end of the crankshaft. The front end gears are of the helical spur type. Those on the crankshaft pump and governor shafts are of drop-forged steel while the idler and camshaft gear are of semi-steel driven out.

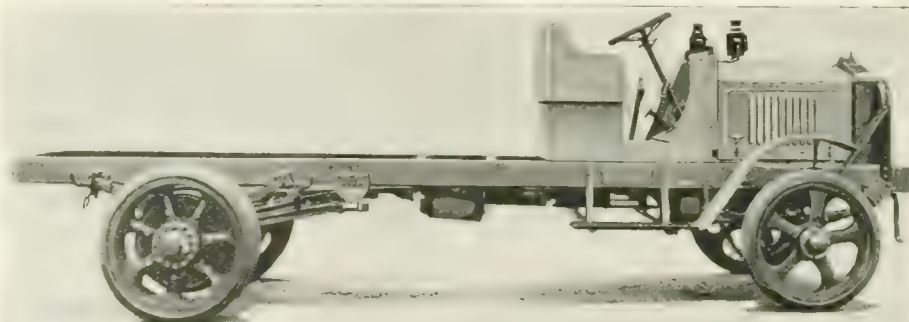
Water circulation is taken care of by a centrifugal pump which is driven from

the front end gears. The radiator is of Long design with vertical tubes and cast water tanks, top and bottom. The tanks are bolted to the tubes. Cork gaskets are used at these points to prevent leakage. The water capacity including pipes and cylinder jackets is 38 qts.

The centrifugal governor is built into the engine and the adjustment can be locked and sealed. Hot air is supplied to the Stromberg carbureter from a

## STANDARD SPECIFICATIONS

Capacity, tons	5
Price	\$5,250
Wheelbase, in.	164 1/2
Tires, front	36x6
Tires, rear, dual	40x6
Bore, in.	4 3/4
Stroke, in.	6
N. A. C. C. hp.	36.1
Speed, r.p.m.	1,300
Speed, m.p.h.	10
Final drive	Worm



*The new 5-ton Standard has a 164 1/2-in. wheelbase*

stove on the exhaust pipe. Fuel is fed by vacuum from a 27-gal. tank located under the seat. The intake manifold is designed to supply the engine with a dry and completely vaporized gas.

Ignition is taken care of by an Eise-mann magneto with manual spark control. The magneto is attached to a pad on the left side of the crankcase by means of a simple clamp.

Lubrication is by a positive pressure feed to all the bearings including the piston pins. The oil pump is of the spur-gear type.

The Brown-Lipe dry-disk clutch is a unit with the engine. The bell housing encases the entire clutch unit affording complete protection from dirt and water. The clutch consists of eight sets of dry disks with alternate disks faced with an asbestos composition friction material. Pressure is applied to the disks by heavy coil springs of proper length to compensate for all wear. No adjustment is necessary.

The four-speed selective Brown-Lipe gearset is located amidships, supported in the chassis at three points to two pressed channel cross members.

Drive is taken through a two-piece tubular driveshaft. The working parts of the Spicer universal joints are completely enclosed in dirt-proof shells, which also retain the lubricant. The driving thrust from the rear axle is transmitted to the chassis through radius rods of heavy I-beam section with a swivel eye at the front end to relieve the twisting. Torque reaction from the axle is taken by the Standard Parts rear springs, which cushion the shock loads due to sudden starting and braking. The springs are semi-elliptic both front and rear. They are made of carbon steel except the main plates which are silicon-manganese alloy. All plates are properly heat-treated. The front springs

are 46 1/2 in. long and 3 in. wide, twelve plates being used. The rear springs are 53 in. long and 4 in. wide, seventeen plates being used.

The Timken worm-driven rear axle is of the full-floating type, having a wheel track of 69 1/2 in. The worm and wheel reduction is 11.66 to 1. The brakes have a 24-in. diameter and are 4

in. wide. The service and emergency brakes are on the rear wheels and are of the duplex type internal-expanding. The brake shoes are faced with woven asbestos and wire fabric. The bearings are all Timken taper roller. The wheels are metal, made by the Dayton company.

The frame, of A. O. Smith design, is of pressed steel material and semi-flexible construction. The plate is 5/16 in. thick and the side bars are of channel section, 7 1/8 in. deep over the flanges. The flanges are 3 1/2 in. wide. The total width of the frame when assembled is 38 in. The cross members are of deep channel section with integral gussets hot riveted to the side bars.

The chassis is sold completely equipped ready for the road finished in one coat of priming paint. It includes a driver's seat, cushion and back, dash, footboards, mudguards, bumper, radiator guard, side and tail lamps, horn, jack and a complete set of tools in a tool box attached to the running board.



## Cyclone Enters Truck Field with 1½-Tonner

### CYCLONE SPECIFICATIONS

Capacity, tons	1½
Price	\$2,800
Wheelbase, in.	136
Tires, front	34x6
Tires, rear	36x6
Bore, in.	5½
Stroke, in.	5
N. A. C. C. hp.	19.6
Speed, r.p.m.	1,800
Speed, m.p.h.	23
Final drive	Int. Gear

**T**HE Cyclone Starter & Truck Co., Greenville, S. C., has completed the first unit of its plant and is now in production on its first model, a 1½-tonner. This company was formed principally to meet the demand for a truck particularly adapted to southern road and traffic conditions. The new truck is particularly suited for southern farm hauling.

The price includes pneumatic tires with a spare rim, pump, jack, tire repair kit, Westinghouse starting lighting and ignition in conjunction with a Prest-O-Lite battery, electric horn, bumper, front fenders, steel cab with curtains, ammeter, hubodometer, Alemite oil pressure system, and a complete set of tools. The wheels are of the wood disk type, made of tough gum, ply upon ply of close

fibered wood being consolidated under pressure into one integral part. The maker of these wheels is the Dayton Automotive Wheel Co.

The length and width of the body that can be fitted on this truck is up to 11 by 7½ ft.

The truck is assembled from standard



New Cyclone 1½-tonner

units which include a Herschell-Spillman four-cylinder block engine; Savage pressed steel frame of flexible construction, Long verticle finned tube type of radiator with a pressed steel case, Wheeler-Schebler carbureter, Warner clutch and gearset, Columbia front and Torbensen internal-gear driven rear axles, Rowland springs, Ross steering gear, and Goodyear-Norwalk fabric universal joints.

Water is circulated by thermo-syphon. Fuel is fed by gravity.

## Warner Brings Out Two-Way Dump Body

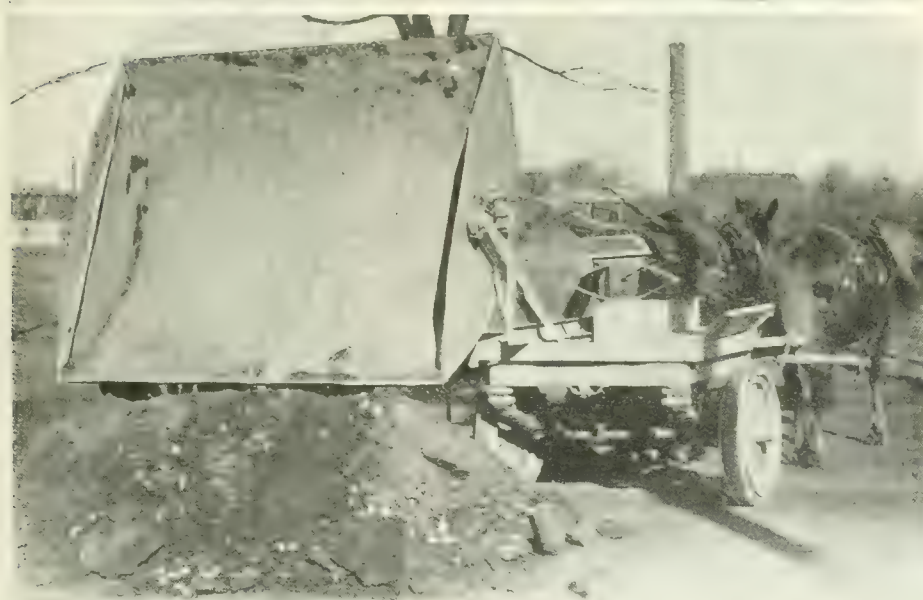
**T**HE peculiar conditions attached to ash, rubbish and garbage removal in municipalities have been given due consideration in the design of both the trailer and new two-way side dump body, recently placed on the market by the Warner Mfg. Co., Beloit, Wis.

The outstanding features connected with the design of the new Warner product include interchangeability of the trailer equipment with other bodies for other uses; simple construction in both trailer and body, giving low rate of depreciation and long life; possibility of operating the trailer and turning it around in narrow alleys; and a simple body construction for complete discharge of the load.

The 2½-yd. body has a loading edge from the ground of 59 in. The 3½-yd. body is 62 in. When the body is dumped, the lower edge of the body clears the dumpage. The body is under constant control of cables, thereby eliminating the jumping off of the body from the trailer.

Quick operation is another feature. The body is raised in 50 sec. to complete a dumping position. After dumping, the body returns to its horizontal position by gravity.

On account of the light weight of the outfit, it is possible to use horses or mules for pickup work to designated places after which the trailers and bodies may be hauled to the dumps by truck or tractor.



Interchangeability and quick operation are two features of the new Warner dump body



# Shop Equipment

*Time and Money Saved  
in Truck Repairs*

## Kwick-Way Valve Facing Machine

THE Kwick-Way valve facing machine has been designed for the purpose of refacing valves preparatory for grinding. The valve is held by an especially designed chuck and rotated while the face is being trued up with a high speed grinding wheel. The chuck shaft, grinding wheel and motor are mounted on a symmetrical cast iron base. This machine will take any size valve up to and including 3-in. head and ½-in. stem. By means of a graduated dial, it can be set to grind valves at any angle from 25 to 65 degrees.

The maker in placing the product on the market believes that the only practical method of grinding valves is—first, by truing up the face of the valve relative to its stem and second, by truing up the valve seat relative to the valve stem guide. Then the operation of grinding-in with a fine grinding compound takes but a moment. The maker of this machine is the Cedar Rapids Engineering Co., Cedar Rapids, Ia.

## Canedy-Otto Press

A HANDY tool for truck repairshops is the Canedy-Otto straightening press No. 1 which can be fastened to a bench near the lathe. The length of the table is 13 in. and the diameter of the screw is 1½ in. The extreme distance from the screw to the table is 4½ in. This press has a capacity of 6 tons, the

*Kwick-Way Valve Facer  
Canedy-Otto Straightening  
Press*

*Spencer-Smith Pistons*

*Sibley Drill Machine*

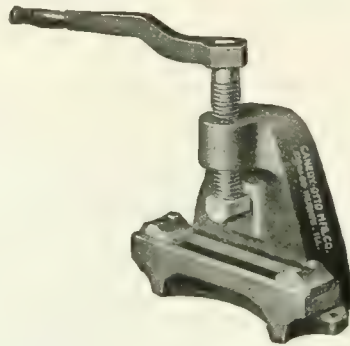
*Continental Piston*

*Aligner*

*Kellogg Air Compressor*

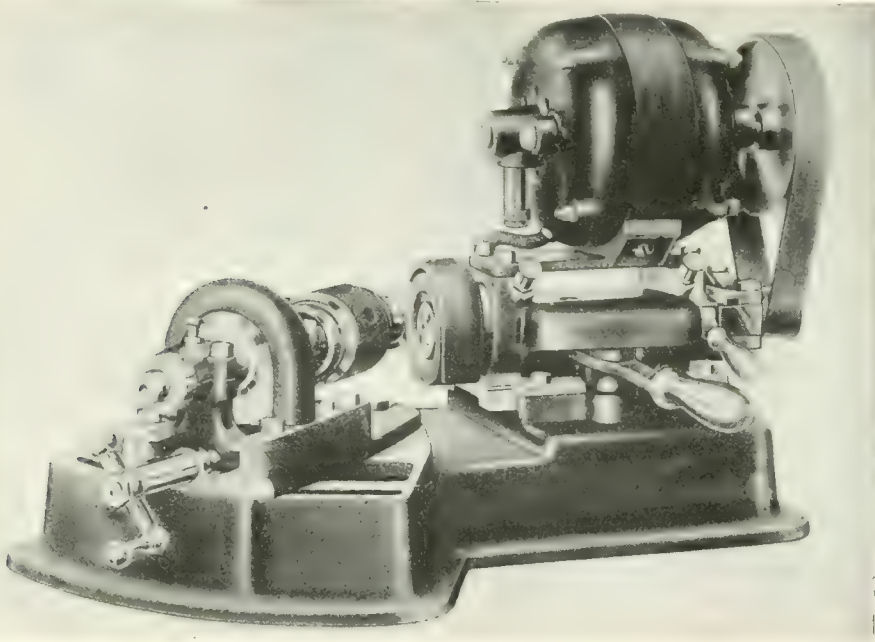
*U. S. Drill Stand*

*Weaver Rim Anvil*



*Canedy-Otto straightening press*

net weight being 93 lb. The list price is \$21.50. The maker is the Canedy-Otto Mfg. Co., Chicago Heights, Ill.



*Kwick-Way valve facing machine*

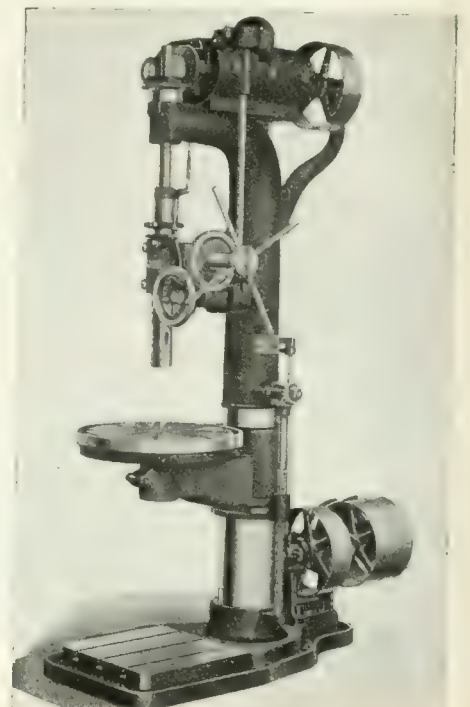
## Spencer-Smith Pistons

FLEET owners during the engine overhauling period often find it necessary to replace wornout pistons with new ones. In many cases there is need for oversize pistons and frequently the demand for these cannot be taken care of. The Spencer-Smith Machine Co., Howell, Mich., makes a specialty of this replacement work and is in a position to furnish pistons for between seventy and seventy-five truck models. The accompanying illustration shows a special type of replacement piston which has been designed for use in the Oldsmobile speed wagon. This company is at present designing a new light weight semi-steel piston to replace the aluminum unit now being used in the Reo speed wagon.

Spencer-Smith pistons are not made from grey iron castings, but a special analysis semi-steel is used which produces a casting of much finer grain. The pistons are annealed to 1350 deg. Fahr. to relieve the metal of all strain. After the annealing operation, the pistons are centered from the open end and rough turned, after which they are re-centered from the head of the piston and are finished machined.

## Sibley Drill Machine

THE Sibley all-gear driven machine will drive high-speed twist drills at their most economical speeds and feeds



*Sibley drill machine*



and with a minimum consumption of power. The drive is arranged in the most direct manner possible, and as the pulleys are of large diameter and wide face, much power is delivered to the drill point. Model B, shown in the accompanying illustration, will drive high speed drills up to 1¼ in. diameter to their full cutting edge capacity and will handle larger drills if occasion requires.

The machine can be started, stopped and feeds changed by the operator without moving from his position in front of the press. All gears being protected, the safety of the operator is assured. This machine is furnished at extra charge with a geared tapping attachment, belt motor drive, quarterturn countershaft, oil pump outfit complete. The maker is the Sibley Machine Co., South Bend, Ind.

### Continental Piston Aligner

**I**N rebuilding engines it is absolutely essential that the pistons and connecting rods be lined up carefully so that the pistons will work absolutely in the center of and parallel with the cylinder walls. Pistons that are out of alignment soon wear out of true and cause trouble such as "stuck" and leaky rings—piston slaps and loose bearings. The Continental aligning device lines up the piston in connection with the rod, crankshaft and cylinder.

In actual operation the lower connecting rod bearing is clamped around the correct size bushing, as it is fitted to the crankshaft, and this bushing is placed on the standard size arbor of the machine. The movable disk is then moved out against the side of the piston and firmly clamped in position by use of the locking screw just back of the disk. The test is made by ascertaining if the piston lines up exactly with the plate. The piston and rod may be swung back and forth across the plate to ascertain the alignment of the lower rod bearing. There is no danger of scoring the lower bearing in this operation as the bushing turns on the arbor instead of the bearing itself turning. The piston can then be rocked on the piston pin to find the alignment of the wristpin bearing.

The device is made by the Continental Auto Parts Co., Columbus, Ind.

### Kellogg Air Compressor

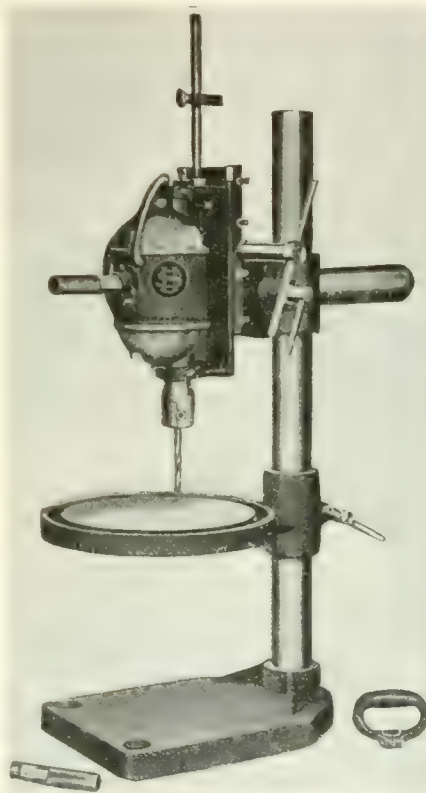
**M**ODEL EM-52 is the latest Kellogg garage compressor pump development. This pump is capable of delivering



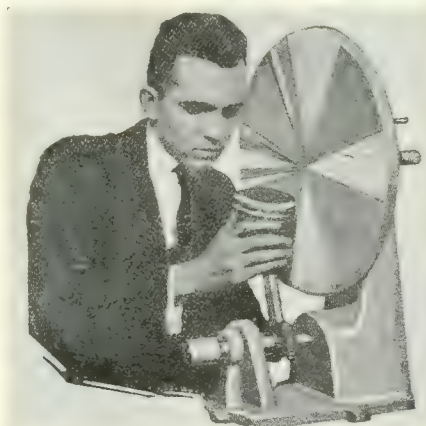
Weaver rim anvil



Spencer-Smith piston



U. S. drill stand



Continental piston aligner

200 lb. of air without any difficulty, being designed especially for fleet owners using trucks mounted with pneumatic tires larger than 40 by 8.

In order to overcome any difficulty which might arise in two or three trucks coming along one behind each other to obtain air, a lever has been installed on the compressor that can be thrown and the pump will deliver air directly into the tire. This is often convenient, for example, if a truck should draw up with 100 lb. pressure in its tire, and at the same time there is only 100 lb. pressure in the tank, it would be much quicker for the pump to raise the pressure directly in the tire than to also put it in the tank.

The manufacturer is the Kellogg Mfg. Co., Rochester, N. Y.

### U. S. Drill Stand

**A** SMALL drilling stand for use in connection with a portable electric drill is being marketed by the United States Electrical Tool Co., Cincinnati. The No. 1 stand holds ⅜ and ½ in. U. S. electric drills, and the No. 3 stand holds ¾-in., ⅞-in., 1-in. and 1¼-in. drills. The rack and pinion feed has a range of 7 in., the diameter of the table is 15 in. and the length of the arm is 12 in. The stand for the 1¼-in. drill is provided with a hand wheel and screw feed.

### Weaver Rim Anvil

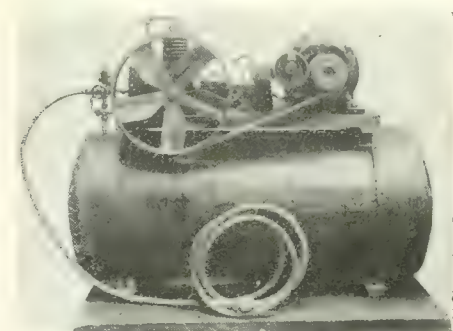
**S**TRAIGHTENING of rim kinks is made easy with Weaver rim anvil which consists of a solid block of gray iron, with a variety of grooves and faces which will accommodate rims of every kind in a vertical or horizontal position. Two hand tools to use in opening up the grooves of the rims are included with each rim anvil.

The anvil is fastened to the work bench by a heavy bolt, which passes through an opening in the anvil. The flange on the bottom of the anvil forms a stop, insuring proper mounting.

The curve of the convex face is such as to make it adapted for the riveting of brake bands. The maker is the Weaver Mfg. Co., Springfield, Ill.

### Arnold Drill Price Is \$106

**T**HE Arnold electric drill described on page 330 of the Dec. 15, 1920, issue of THE COMMERCIAL VEHICLE should have been listed at \$106 instead of \$90.



Kellogg air compressor



# New Accessories and Parts

Chicago Cast Ford Radiator—"Meno" Rust Remover—New Sunderman Products—Martin-Parry Ford Bodies—Rajah Primer—Lutz Truck Chain—Usona Recoil Checks—Bonney Battery and Cup Pliers

## Chicago Cast Ford Radiator

A NEW type of cast radiator for Ford trucks and cars has been placed on the market by the Chicago Mfg. Co., Chicago. A very important improvement in this new radiator is the adoption of the oval tube. Tubes bursting from freezing have always been a great annoyance and expense to fleet owners. The tubes in the Chicago radiator will expand when freezing and therefore will not burst. Another feature is that the water is divided into thin streams, adding much to the efficiency of this radiator.

The top tank, sides and bottom tank, are cast iron. By removing a few bolts the tanks and sides, or even a new core, can be readily replaced with a little trouble or expense. No soldering iron is necessary.

## "Meno" Rust Remover

"MENO" rust remover and cleanser is a blending of certain chemical ingredients which neutralize and quickly dissolve rust, grease, oil, dirt, carbon and paint, that is present on any metal surface. The preparation has the consistency of paste, but flows under a brush like paint, therefore it does not run or drip. It may also be mixed in a vat, tank or container with one-fifth water and the parts to be cleaned hung in the solution. No further attention is required since the process of cleaning goes on while the parts are immersed. "Meno," it is stated, will not burn nor explode. It will protect the metal from rust for a long time. The list price per quart (3 lb.) is \$1.65. One-half-gal. cans cost \$3. It is sold in barrels. The sole distributor is Peter A. Frasse & Co., New York City, Philadelphia, and Buffalo.

## New Sunderman Products

THE SUNDERMAN CORP., Newburgh, N. Y., has added two new products to its line of automotive accessories. These are the Atlas hydraulic jack and a knee steering control.

The jack is built entirely of steel. There are no gears or ratchets, all loads being lifted on liquid fluids. It is made in two sizes, 1½ to 7½ tons. In operation, the handle is placed on the pump socket with the small notch downward. This notch fits into the slot or slide and stops the handle on the bottom stroke to prevent tripping same, when the jack is being pumped. The jack is lowered by pulling the handle out slightly and pushing down the entire distance of the slot

which trips the jack. The jack is filled by taking off the top or lift cap, which is held in place by two set screws. A brass plug with a screw driver slot along the side of the plunger is next removed and light oil is inserted. The smaller size costs \$7.50 and the larger \$15.

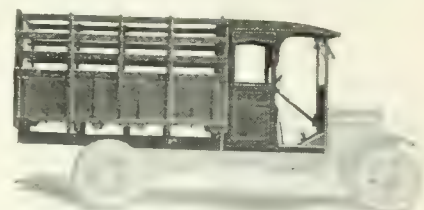
The knee steering control is a safety device designed to prevent accidents that frequently occur when the hands are taken off the steering wheel. The device is clamped onto the steering arm, the controlling arm being swiveled so that it can be placed out of the way when not in use. The price is \$2.



*Special wide express body for Fords*



*New six-post Martin-Parry express body for Fords*



*Martin-Parry stock body*



*Martin-Parry steel panel body with closed cab*

## Martin-Parry Ford Bodies

STANDARDIZED design and construction with interchangeability of body parts, is the outstanding feature of the new line of commercial bodies for Ford chassis, just put on the market by the Martin-Parry Corp., York, Pa. and Indianapolis, Ind.

The new line includes more than thirty different models, with styles ranging from light weight enclosed panel bodies for use on the Ford Model T chassis in store delivery work, to heavy duty racks for hauling live stock.

The new bodies are built in two general sizes for the Ford car and truck and are known as the "100" and "200" series respectively. Each model number is followed by the letter "A" or "B," the first letter denoting an open front body, and the latter a closed cab model.

The buyer is given a wide selection of finished steel panel bodies. Sills, cross sills and floor frames are of selected hardwood, reinforced at joints with special irons. Inside of each panel body is full slatted. The double rear doors also are of sheet steel on non-sagging frames and equipped with patent fasteners and anti-rattlers.

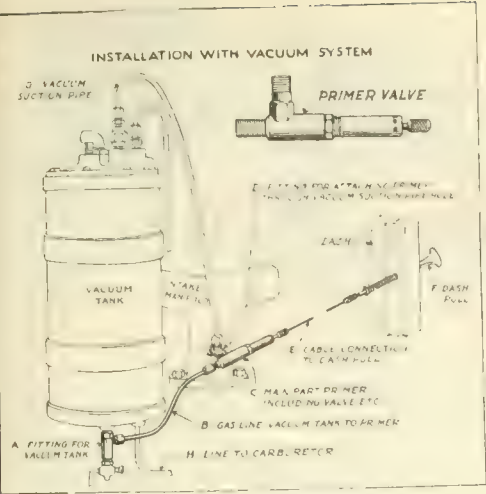
A selection of six post express bodies, open and closed front styles is given. The canopy top is supported by six posts bolted on the flare board and has roll-up curtains all around. The floor is ship-lapped lumber and protected with steel strips.

Two new models of cabs are presented. No. 20A with open front and No. 20B with enclosed front, including two doors that run full height of the cab, swing clear back and are held with spring catches. For summer use the doors can be easily removed. The cab frames are of selected hard wood, floors and backs are of yellow pine, and the side panels are of sheet steel. Windows of ample width at each side give the driver clear view of traffic. The window at the driver's side can be raised to permit of signaling. The upper section of the windshield swings forward and backward and can be held in any position. The bottom section is stationary. The tops of the cabs are curved and covered with heavy oil duck.

## Rajah Primer

THE Rajah primer is designed to add a small amount of gasoline to the regular mixture to enrich it in its flow through the intake manifold from the

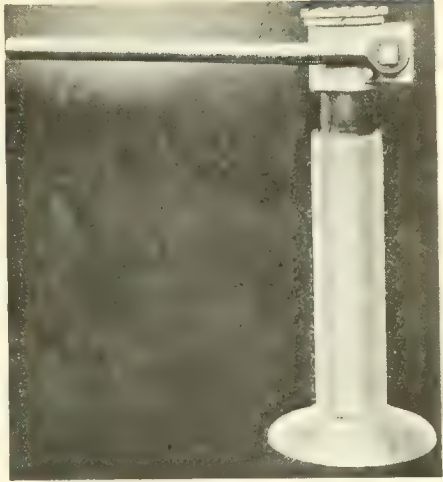




Rajah primer installation



The new Chicago cast radiator for Fords has oval tubes



Atlas hydraulic jack

carburetor to the engine without requiring the choke to be closed.

The valve is attached to the intake manifold above the carburetor, the gasoline being supplied by gravity or pressure from the regular supply system—preferably from the bottom of the vacuum tank—the quantity used being always under the control of the operator.

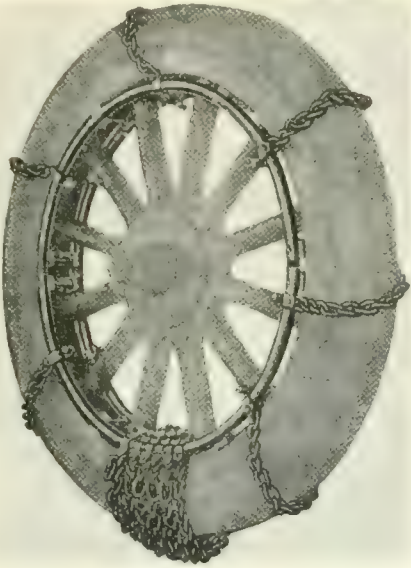
The construction of the valve and its operation is such that a quick start is certain under all conditions of weather—thus reducing the strain on both the starter and batteries. Also through the valve a small amount of gasoline can be fed drop by drop into the intake to heat up the engine, until the carburetor begins to function properly.

The list price is \$5, including standard fittings. The maker is the Rajah Auto-Supply Co., Bloomfield, N. J.

**Lutz Truck Chain**

LUTZ unit safety chains for trucks are designed with a fool-proof coupling and an instant means for replacing broken chains without tools or removing from the tire. In addition to these features, it is possible to add extra cross chains at any time to meet unusual road or accident conditions.

The cross chain connecting hooks are made of spring tempered steel, especially coiled to provide free movement in either direction on the retaining cables, between their respective cable stops, insuring uniform wear on the tread of the



Lutz truck chain

tire by reason of this variable movement of the cross chains.

The chain clamps may be snapped on the pipe coils or removed with ease. The clamps permit of instant take-up of slack in the chains, lessening noise and possible damage to the brake drum connections and immediate removal of broken or worn chain and substitution of a new chain in its place.

The retailing pipe coils are firmly and permanently attached to the wheels adding strength with protection against injury.

Lutz chains may be used on pneumatic duals as well as on solids and are made by the Lutz Co., Philadelphia.

**Usona Recoil Checks**

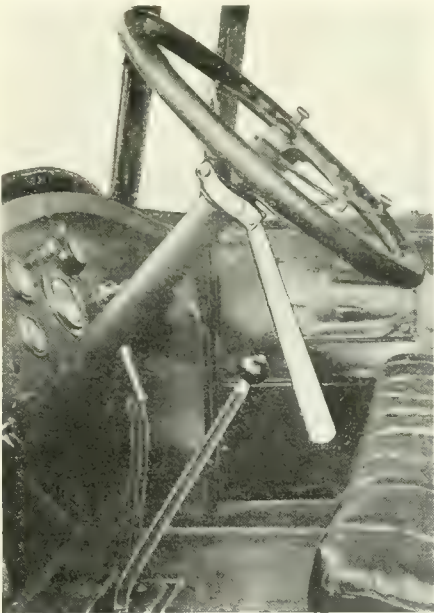
USONA shock absorbers take the place of the standard spring shackles. It is claimed that they do not interfere with the downward action, but check the upward reaction. The price per pair is \$15. The maker is the Usona Supply Co., Chicago.

**Bonney Battery and Cup Pliers**

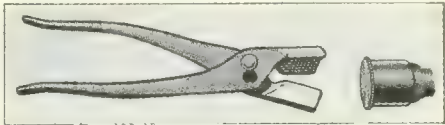
MECHANICS will find the Bonney battery and grease cup pliers of practical use. The action of this tool is from any angle. The teeth are cross milled in double concave jaws. The adjustment is similar to the adjustment on the Bonney combination pliers. The rivet slides between two holes on either of which it operates. There are two adjustments—one for small posts, terminals and grease cups, and the other for large ones. The pliers are 9 in. long and made from drop forged steel. The price east of the Mississippi River is \$1.50. It is higher in southern and western points. The maker is the Bonney Vise & Tool Works, Allentown, Pa.



Usona recoil check



Sunderman knee steering control



Bonney pliers





## Trucks at the Roundhouse

**I**MAGINE a large locomotive roundhouse. All around are tracks leading to it like the rays from the sun. Inside are the giant locomotives. Some have steam up. They have just come in from their runs. Smoke from the furnaces of their boilers and exhausted steam from the air pumps are shooting out of their stacks and up and out of the small chimneys in the roof. Amid the ringing of their bells as some locomotives are coming in and others are going out, there is much activity inside.

Gangs of expert mechanics are going over each engine. Some are sounding rivets, others testing bolts and still others adjusting one part or another until every piece has been tested for looseness, wear or breakage.

If, while looking at this mental picture of a locomotive roundhouse, you would be greatly surprised if you should perceive some commotion on one of the tracks inside and emerging from within not a locomotive, but a large motor truck!

"There's something wrong here," you would say to yourself, and you would be right, for motor trucks are not frequent visitors in locomotive roundhouses. The mental picture is merely drawn to point out the analogy between the locomotive and the motor truck and why the roundhouse service for one is also necessary for the other. The truck garage with an adequate inspection system is to the motor truck what the roundhouse is to the

modern steam locomotive as we know it to-day.

If the locomotive is inspected at the roundhouse after every trip of from 150 to 200 miles before it is sent out on its next trip, it is just as necessary that the motor truck be inspected every night after its day's work is done.

Consider the service rendered by these two means of transportation, the locomotive and the motor truck. Only in one respect has the motor truck an advantage over the locomotive, that its wheels are shod with rubber instead of steel. But this is no real advantage when the smooth steel rail of the locomotive is compared with the rough, bumpy road of the motor truck.

The locomotive is perhaps twenty times as heavy as the average 5-ton truck. It absorbs the light shocks of the rail with comparative ease. But not so with the light motor truck over the rough road where the impact of ruts, depressions and high spots is transmitted directly to the truck mechanism with its delicate carbureter and fuel system, cooling system, small pipes, wires and sensitive electrical instruments. Consider also the slow speed of the locomotive engine with its few hundred revolutions per minute and compare this with the high speed engine of the motor truck with a thousand or more revolutions per minute. Surely the motor truck is entitled to adequate roundhouse inspection. And such inspection it must receive if its life is to be a long and useful one.

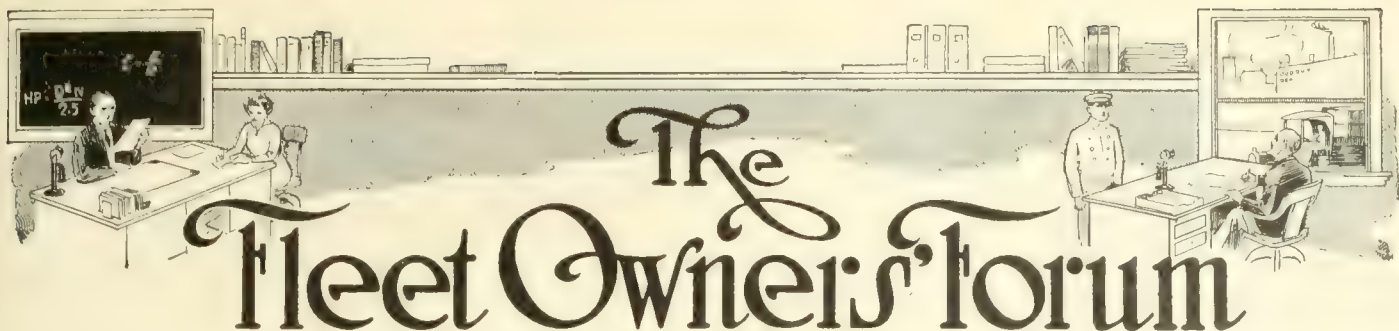
## The Mileage Measurer

**A** MILEAGE-MEASURING instrument of some sort on every truck is the first requisite to enable the fleet owner to calculate his true truck costs. Keeping accurate account of the bills for supplies, repairs, labor and fixed charges and then estimating truck mileage is a procedure of doubtful value when true truck costs are desired.

It is a sad commentary upon the motor truck industry, which is attempting more and more to sell trucks as an economical means of transportation, that only 258 models or 48 per cent of the 527 gasoline models listed for the 1921 market are fitted with some form of mileage-measuring device

when they leave the factory. This surely is not one way to make it easy for the fleet owner to keep accurate truck costs. This is of all the more importance when it is realized it is upon proof of truck transportation economies as represented by true costs that the future growth of truck use depends. More than half of the present truck users must now take the long way around of installing such instruments after their trucks have been purchased. Many do not install them, and this explains in part the dearth of true truck costs. Certain it is that without an accurate mileage record, true truck costs are not obtainable.





# The Fleet Owners' Forum

## Estimating the Ton-Mile Cost Puzzles One Reader

To the Editor, COMMERCIAL VEHICLE:

Will you kindly solve in your Fleet Owners' Forum Department the problem given below:

A truck in one year's time hauls, in the aggregate, 15,000 tons and in doing so covers 10,000 miles for an expense of \$7,000. What is the average cost to haul 1 ton 1 mile? You are to remember that the 10,000 miles is the speedometer reading, consequently you cannot suppose that the truck was loaded every mile it travelled.—EDWIN SANDERS, Polar Wave Ice and Fuel Co., St. Louis, Mo.

From the data given in your letter, it is impossible to estimate the cost to haul 1 ton 1 mile for the period given. You can, however, figure the cost per mile. This would be the total cost divided by the tonnage, or \$7000 divided by 15,000 tons, which gives a cost per ton hauled of 46 2/3 cents.

In the same way, it is possible to estimate the cost per mile for the period. This figure would be the total cost divided by the mileage, or \$7000 divided by 10,000, which gives 70 cents a mile.

But it is not possible to estimate the cost of hauling 1 ton 1 mile from the data given, because there is no information as to the average tonnage carried by the truck throughout the period.

In any case, it would not be of any value to ascertain the cost of hauling 1 ton 1 mile, because such a figure is not comparable with other cost figures calculated by usual methods. The figure that is desired is the cost per ton-mile or per commercial ton-mile as used in THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. This figure is called the commercial ton-mile to distinguish it from absolute ton-mile.

The reason for the selection of the commercial ton-mile as a basis on which to estimate trucking costs is simply that it can be obtained readily in any or all possible cases.

A full explanation of the ton-mile and the commercial ton-mile will be found on page 10 of the instruction book on THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. The same ton-mile, derived in the same manner, is also used in other cost keeping systems now used by truck owners, so that it remains a constant basis of comparison.

It is essential to remember that the ton-mile is merely a unit, arbitrarily chosen for the convenience of having some standard basis on which to esti-

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

mate truck costs, and that the ton-mile is based fundamentally upon the trip. Therefore, unless the number of trips made during the year is known together with the average number of tons hauled per trip, it is not possible to estimate the cost per ton-mile.

The ton-mileage for any given period or set of conditions may be determined in one of two ways. First, for a given period it may be obtained by multiplying the total tons carried during that period by one half the average trip distance during the same period. Second, it may be determined per trip and the total ton-mileage for the period by multiplying the average ton-mileage per trip by the number of trips made. To figure the ton-mileage per trip, multiply the tonnage carried on the trip by one half of the round trip distance. By either method the cost per ton-mile is obtained by dividing the total cost of operation by the number of ton-miles of work performed during that period.

### The Method Applied

Using the first method and applying it to the case given after assuming an average round trip distance of 5 miles, the cost per ton-mile will be \$7,000 divided by the fraction of 15,000 tons times 5 miles divided by 2, or 18.7 cents. Figuring the same case by the trip method and assuming 5 tons carried per trip, the ton-mileage per trip would be 5 tons times the fraction of 5 miles divided by 2, or 12½ ton-miles per trip. Dividing 15,000 tons carried by 5 tons to the trip would give a total of 3000 trips made in the period given. The total ton-miles would give a total of 3000 trips made in the period given. The total ton-miles would thus be 3000 trips times 12½ ton-miles or 37,500 ton-miles. Dividing the total cost of \$7000 by 37,500 ton-miles gives the same result as figuring by the first method, or 18.7 cents per ton-mile.

If you wish to employ THE COMMERCIAL VEHICLE Cost Keeping System, you may obtain it from the U. P. C. Book Co., Inc., New York City.

## Oversize Pneumatics Save by Increasing Mileage

To the Editor, COMMERCIAL VEHICLE:

Perhaps a number of your readers have been worried by the high cost of pneumatic truck tires, without being able to figure out the cause. It has been our experience that putting on oversize pneumatics will sometimes save money in the end.

In regard to pneumatic tires we have had a lot of experience. We are now putting on larger ones. We have been using 40 x 8 pneumatics, but we are putting on 42 x 9. We have one set of Goodyear, 42 x 9, on now and they have gone nearly 8000 miles and are looking good yet.

The capacity of the trucks is 2 tons, the average truck load carried, 4100 lb., the front tires 36 x 6, the rear tires 40 x 8 and 42 x 9, and the make of tires Goodyear, Firestone, Goodrich and Brunswick. The trucks were bought equipped with pneumatics.

The front tires give more mileage, on an average, than the rear tires, the front averaging 8000 and the rear 5000 miles. Our chief tire troubles have been blow-outs rather than punctures.—Motor Transit Co., Muskegon, Mich.

The above is an interesting suggestion that may well be valuable where pneumatics do not give their rated mileage. But it is also a little puzzling.

A reference to truck specifications on 1921 models shows that the Keystone, a representative 2-ton truck equipped with pneumatics as standard equipment, carries 34 x 5 pneumatics in front and 38 x 7 pneumatics in the rear. These sizes should, therefore, be all that are necessary for a truck rated at 2 tons capacity. But it must be remembered that a 2-ton truck is designed to carry 2 tons and no more—or very little more—so, if the truck is seriously overloaded, these tire sizes will not be very satisfactory.

But the Motor Transit Co. finds it necessary to equip its trucks with oversize pneumatics both front and rear—36 x 6 instead of 34 x 5 in front, and 40 x 8 or 42 x 9 instead of 38 x 7 in the rear. It is probable that serious trouble with pneumatics of the same or greater sizes than 34 x 5 and 38 x 7, mentioned above as suitable for a 2-ton truck, is due to overloading of the trucks. On this account, it is possible that the trucks of the Motor Transit Co. are being subjected to greater overloads than the company realizes, unless the roads on which the trucks operate are so very bad as to be exceedingly destructive to the tires.



## Waterproof Glues for Cementing Linoleum Covering

To the Editor, COMMERCIAL VEHICLE:

I would like to procure a waterproof glue for use in cementing the linoleum covering on the floor of my truck. Ordinary glue, I find, disintegrates and the linoleum comes loose after the vehicle has been washed a few times.—C. S. W., New York City.

Some of the new waterproof glues developed primarily for aircraft purposes during the war offer the possibility of overcoming the difficulty you have encountered. Ordinary glues which are soluble in water are not effective in cementing linoleum and most truck owners soon discover that the glue disintegrates and the linoleum comes loose after the vehicle has been washed.

Casein glues are admirably adapted to this purpose, and if the quality is right and they are properly applied the linoleum should give no trouble during the life of the truck. Casein glues are exceedingly resistant to the action of water and retain a very high percentage of their original strength, even after long immersion under water. Information on casein glues and their application may be obtained from the Forest Products Laboratory of the U. S. Forest Service, at Madison, Wis.

## Engine Overheating May Be Due to Scale Accumulations

To the Editor, COMMERCIAL VEHICLE:

My engine has been overheating and I have been unable to stop it. I have cleaned out the radiator, and have inspected my timing. What other remedy would you advise?—D. KENDALL, Paterson, N. J.

Your trouble may be due to an accumulation of engine scale. This is a cause of serious engine overheating and there are two methods of coping with it.

In certain territories, owing to the quality of the water, undue heating of engines has been caused by an accumulation of lime, iron or other impurities in the water jackets of the engines. These impurities stick to the outside of the cylinder walls and to other parts of the cooling system just as scale sticks to a boiler. They form a dense and rigid armor-plating or sheath on these surfaces, and this sheath acts as an insulating wall between the hot cylinder and the water causing serious overheating.

These accumulations may be removed by means of a solution of hydrochloric (muriatic) acid, or caustic soda. Caustic soda is slightly less effective in removing the scale than hydrochloric acid, but it has one advantage. Unless hydrochloric acid is thoroughly cleaned out of the cooling system, it will gradually eat away any brass there may be on the pump. The use of caustic soda avoids this danger.

Caustic soda breaks up the hard deposit of scale into a powder or sludge which can subsequently be removed by a thorough flushing out of the pipes with water. This action only takes place, however, if the strength of the solution of caustic soda lies between 15 per cent

and 22 per cent. With solutions much weaker or stronger than these figures the action is very slow or inappreciable.

The solution is made in the correct proportion by dissolving 2½ lb. of solid caustic soda so that it makes 1 gal. of solution; 5 lb. so that it makes 2 gals., etc. The solution should be allowed to remain in the cooling system all night and run off in the morning. Caustic soda will corrode aluminum and should not be used if the cooling system has an aluminum pump cover.

The hydrochloric acid solution consists of one part of the acid of a specific gravity of 1.20 and three parts of water, by volume. This solution should be poured into the engine cooling system, through the upper water connection, until this part of the cooling system is quite full. It should be pointed out here that this solution must not be used in radiators, because it will attack any impurities in the copper and result in leaks in the radiator and a general weakening of the latter.

## Knowledge Is Power

Are you handicapped for facts?

Is there some problem that is annoying you and holding you up in your business?

Let us solve it for you!

This forum is for you. It is a regular feature in each issue.

## Let Us Serve You

## Timing Engine Without Using Flywheel Mark

To the Editor, COMMERCIAL VEHICLE:

Please give the easiest way to time the valves on any engine without using the flywheel mark. When the exhaust valve in the first cylinder is about to open, where must the piston be placed?—M. S., New York City.

The valves of any engine may be timed without any reference to any marks or characters whatsoever if one bears in mind the principle of operation of the four-cycle engine. The first stroke down of the piston is always the intake stroke. During this stroke the engine draws its charge in, consequently the intake valve must begin to open at the time the piston starts its descent. Generally the intake starts to open when the flywheel has turned about 1 in. beyond the upper dead center mark.

With these facts in mind it is only necessary to disengage the camshaft gear from the crankshaft gear and then turn the engine over until the piston of say number one cylinder is on top dead center. Then turn the engine further in the same direction until the periphery of the flywheel has passed the dead center position by 1 in. The camshaft should then be turned in the direction of its natural rotation until the intake valve of number one cylinder starts to open. The gear of the camshaft should now be tightened in place.

## Systems in Use for Determining Fuel and Oil Consumption

To the Editor, COMMERCIAL VEHICLE:

Will you kindly give me any information on fuel and lubricating oil consumption and a chart or other system for arriving at this consumption?—E. L. DOOLAY, Cranbrook, B. C.

There are several methods in use for ascertaining the amount of gasoline and lubricating oil used by individual trucks. One of these is a record attached to the gasoline pump itself which registers the amount of gasoline pumped out each time. This can be used to check the driver's record of the amount drawn and charged against the individual truck. Such a device has been designed by H. H. Patterson, Hartford, Conn., and costs \$35. It is fully described in an article on page 156 in the April 1, 1920, issue of THE COMMERCIAL VEHICLE.

Another method used by many fleet owners is the system by which the gasoline and oil are issued to the driver by one man who is responsible for this work. In such cases, the man may be supplied with a recording machine such as that made by the Standard Register Co., Dayton, Ohio, on which he writes the name of the driver, the number of the truck and the amount of oil issued each time. The machine registers in triplicate on a roll of paper and one copy remains permanently in the machine while the other two may be distributed as desired. There are several types of this machine on the market. An illustrated article describing the use of this machine will be found on page 364 in the July 1, 1920, issue of THE COMMERCIAL VEHICLE.

The following figures may be taken as a rough approximation of the gasoline and oil consumption of the various sizes of trucks:

Truck Capacity Tons	Gasoline M. P. G.	Oil M. P. G.
½ .....	12 to 14 .....	200
1 .....	10 to 12 .....	200
1½ .....	9 to 11 .....	180
2 .....	8 to 10 .....	175
3 .....	6 to 7 .....	150
3½ .....	5 to 6 .....	150
5 .....	4 to 5 .....	100

It is very difficult to give any accurate average figures on gasoline or oil consumption of motor trucks because these vary greatly, even with the same makes and capacities of trucks according to the conditions of loading and roads. For instance, some truck owners who load their 3-ton trucks with 3½ to 4 tons of goods naturally have a higher gasoline and oil consumption per mile than do other truck owners who carry only 3 tons of load in 3-ton trucks and others whose trucks run only partly loaded on one leg of the trip and empty on the return run.

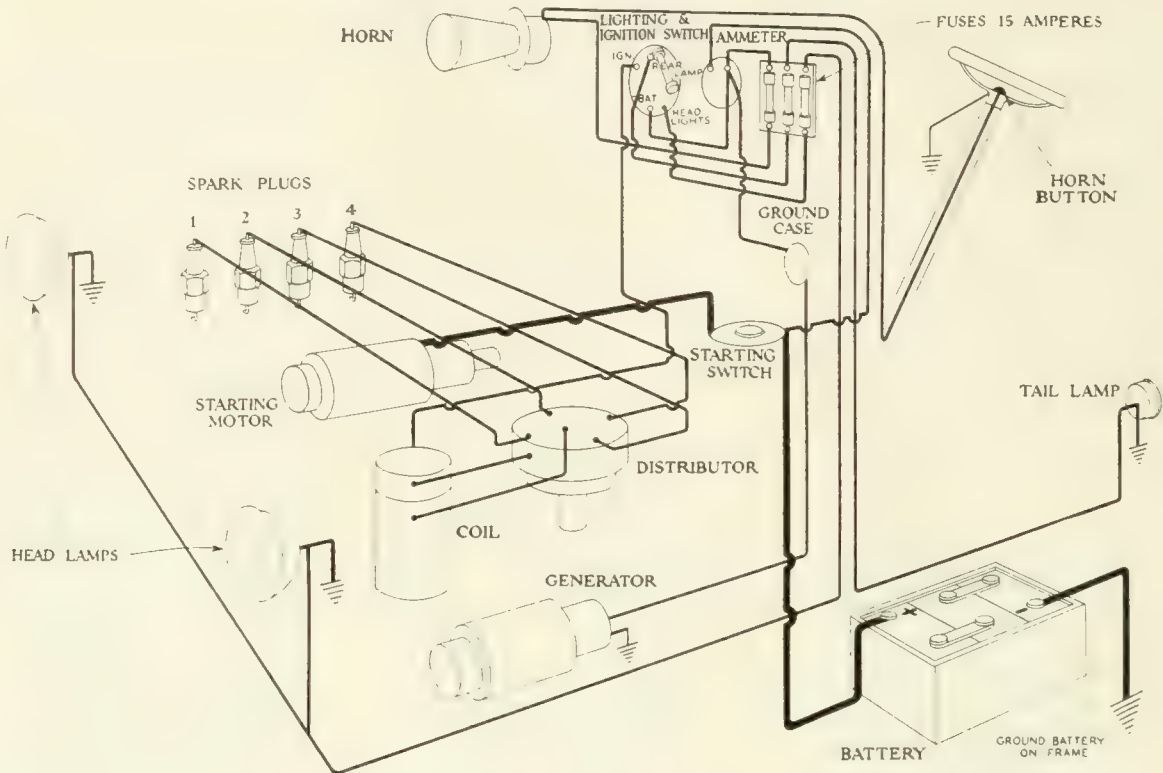
Roads also have a considerable influence on gasoline and oil consumption, as it is evident that trucks running over well-paved city streets will naturally consume less gasoline per ton-mile than the same vehicles would traveling over semi-improved country roads. Congested traffic of city streets is another important factor in fuel consumption.



*Method of closing up an opening in a carburetor float. Ice helps to prevent bubbles forming in the brazed seal*

# Motor Truck Electric System Wiring Diagrams

## 15—Starting and Lighting Unit on Vim Trucks



Wiring diagram for types 29 and 30 half-ton Vim trucks, showing the layout for installing the system. In wiring the lighting and ignition switch make sure to connect the battery lead to the post immediately to the left of the resistance coil marked "Bat." In adjusting to change the output of the battery type of generator, the output of the third brush generator is changed by moving the brush either forward or backward on the commutator in relation to the field poles. To increase the current output, the brush must be moved with the rotation of the commutator, and to decrease the current output, the brush must be moved back or against the rotation of the commutator

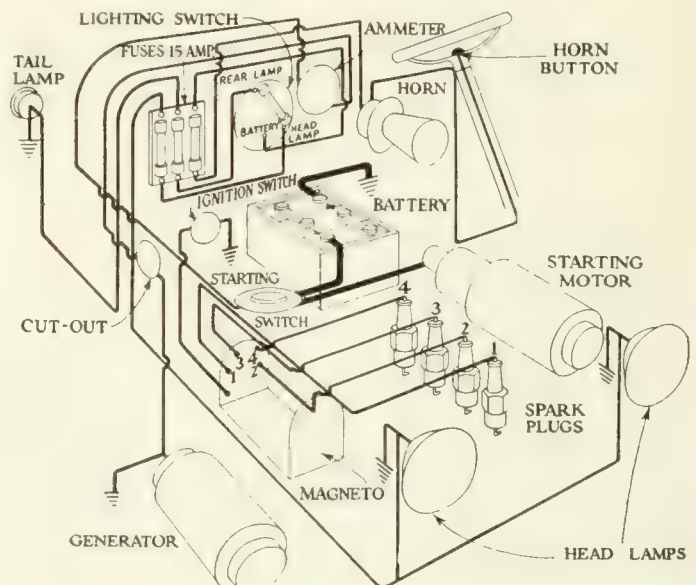
### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE.

1920	
1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting.....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15

1921	
12—Maxwell, Lighting.....	Jan. 15
13—International, Starting and Lighting....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting....	Next Issue



Wiring layout as used on the starting and lighting system of type 31 one-ton Vim truck equipped with a magneto



## Federal Road Plan Is Unsatisfactory

### Congress Declines Action Under Present Plan—Asserts Funds Are Being Wasted

WASHINGTON, Feb. 18—Efforts to force a continuation of Federal aid appropriations for highways by a rider on the Postoffice appropriation bill were defeated in the Senate to-day and assurances given that the proposed plan for a national system of highways as advocated by the automotive industry and organized automotive owners would be considered at the extraordinary session of the next Congress. Senator Thomas, of Colorado, supported Senator Townsend of Michigan, and chairman of the Senate committee on Postoffices and Roads, in opposing the amendment of Senator Swanson of Virginia. The Colorado Senator's threat to filibuster indefinitely against the proposed amendment served its purpose and the Senate rejected the Federal aid proposition.

Senator Swanson sought to persuade the Senate to accept his amendment which was the Federal aid bill passed in the House last week. He contended that forty-three State legislatures would adjourn in March without knowing what the Federal Government was going to do in connection with road improvement. The Bureau of Roads data showing that on December 31, 1920, \$149,683,107 was either under actual construction or completed leaving \$117,066,893 on that date available for new contracts was submitted to the Senate.

During the debate on the amendment, Senator Townsend advised the Senate that the committee on postoffices and roads would undoubtedly report on the national highway system measures now pending in committee. He expects that action will be taken by Congress before July 1. He pointed out that it was necessary to devise a scheme to get results for money spent on roads instead of wasting it under the present method of distribution.

### Motor Truck Owners Hit Hard by California's Proposed Tax

LOS ANGELES, Feb. 17—In an effort to increase revenues to offset an enormous deficit in the conduct of affairs of the State of California, the Legislature has singled out the motor vehicle as a chief object for attack at the present session. Almost any sort of a suggestion that concerns additional taxes upon motor vehicles is certain to be given a hearing. Strongly entrenched at Sacramento and leading in the effort to make the motor industry carry the burden is the railroad lobby.

A tax upon gasoline is provided for in one bill that has the support of the Highway Commission. It is proposed in this measure to devote all the money raised from such a tax to highway maintenance. The fishing interests, who are large consumers of gasoline, do not see

very clearly why they should have this tax imposed upon them as the chuckholes and dust encountered upon the Pacific Ocean are beyond the jurisdiction of the Highway Commission. The cleaners, who also are big users of gasoline, admit dusty roads help their business and they would prefer no repairs being made, especially at their expense.

Among one of the proposals is that of a State senator who takes the position the motor buses and trucks are cutting into the revenues of the railroads and therefore should have to bear the same taxes. Here's his tax schedule for buses: less than six passengers, \$250 annually; less than ten, \$500; less than fifteen, \$750; not more than twenty, \$1,000; not more than twenty-five, \$1,250; not more than thirty, \$1,500, and more than thirty, \$2,000.

This is all he seeks to do to trucks: not more than 2 tons' capacity, \$400 annually; not more than 3 tons, \$600; not more than 4 tons, \$800; not more than 5 tons, \$1,000; not more than 6 tons, \$1,200; not more than 7 tons, \$1,400; not more than 8 tons, \$1,600 and 8 tons and over, \$2,000.

### Ranger Price Higher

HOUSTON, TEXAS, Feb. 21—The Southern Motor Mfg. Assn., Ltd., this city, has raised the price of the Ranger truck model TK-22 from \$2575 to \$2875. This model has a 2-ton capacity.

### Clydesdale Price Guarantees

BOSTON, Feb. 23—The Clydesdale Motor Truck Co., Clyde, Ohio, will guarantee present list prices against any reduction until July, 1921. If for any reason a reduction in price should occur prior to July 1, the Clydesdale company agrees to cheerfully refund to all purchasers the amount of such reduction.

### Fuel Prices Drop in Mid-West

NEW YORK CITY, Feb. 21—Gasoline prices have been reduced from 1 to 6 cents a gallon in the principal cities east of the Rocky Mountains, but no reductions have been made as yet on the Pacific Coast. Reductions of 3 cents have been made throughout the eastern territory and of 4 cents in the middle west. In the mid-continent and southwest territory prices have declined in some cities as much as 6 cents a gallon from the peak of 1920. The lowest price is in Kansas City where it is 21 cents a gallon, with St. Louis second at 22.5 cents. Chicago and Houston, Texas, are tied for third place at 23 cents. The price is highest at Butte, Mont., where it is 31 cents.

### Boston Fuel Prices Reduced

BOSTON, Feb. 15—The price of gasoline in Boston yesterday was cut 2 cents a gallon, bringing the wholesale price to 29 cents and the retail price to 31 or 32 cents. Kerosene was also cut 1 cent, which brings the wholesale price to 18 cents and the retail price to 22 cents.

## Unserviceable Trucks Sold by Army

### Orders Issued Start Dumping of 29,000 Motor Vehicles—First Sale at Baltimore

WASHINGTON, Feb. 18—Orders have been issued to all departments of the United States Army to dispose of surplus automotive equipment which it is officially estimated will amount to approximately 29,000 unserviceable vehicles. The sales campaign which was inaugurated at Camp Holabird, Baltimore, this week will be nation-wide, though the vehicles will be concentrated at four camps now under the supervision of the Motor Transport Corps of the Army.

A large number of the trucks have been in operation for some time. Others, though not used, have been exposed to the elements. Being sold at auction, the trucks will go "as is." Under these conditions, a prospective buyer is placed at a disadvantage, unless he is an expert appraiser of truck values.

It is likely that the next sales of surplus equipment will be held at Camp Jessup, near Atlanta, a concentration camp for the Motor Transport Corps, El Paso and San Antonio, Texas, for equipment held on the border, Jeffersonville, Ind., for equipment owned in the Middle West, San Francisco for vehicles held in the West. The Motor Transport Corps also has depots at Columbus, Ohio; New Cumberland, Pa.; Perth Amboy, N. J.; Schenectady, N. Y., and Norfolk, Va.

### Sale in Baltimore

BALTIMORE, MD., Feb. 21—Despite a protest by the Baltimore Automobile Trade Assn. to the Government asking that the sale of used motor vehicles in large quantities be discontinued in Baltimore, officials of the Government sold last week 2100 motor vehicles of all kinds and in various conditions.

Inspection of the trucks by buyers was limited to a look under the hood and a moving of brakes and gears and any other exterior inspection possible, but no vehicles were permitted to be tested as far as operation was concerned.

On the second day some of the big trucks brought as high as \$2400. The lowest price was \$40.

### To Urge Better Parts Service

CHICAGO, Feb. 16—The Motor Truck Manufacturers' Assn., at its annual convention in this city last week decided to urge better parts service. The presentation of the subject of the "Establishing of Distributing and Service Stations by the Unit and Part Manufacturers" was followed by a discussion which ended with a motion unanimously carried that a committee of the association be appointed to lay the facts of the situation before the unit and parts manufacturers as these facts are seen by the motor truck manufacturer.



## Freight Congestion in Philadelphia

### Common Station in Outlying Section of City Needed for Three Trunk Lines

PHILADELPHIA, Feb. 23—That a common freight station in an outlying section of the city, for the three trunk lines now maintaining from thirty to thirty-five distribution points, is needed for the solution of the traffic problem here, was brought out prominently at a dinner given by Herman Schwacke, chairman of the traffic committee of the Motor Truck Assn. of Philadelphia, at City Line Hotel, to the members of the committee, representatives of the Pennsylvania and the Reading railway companies and to leading officials of the Philadelphia police department.

It was also brought out that while the railroads do not wish to lose the short haul business if they can do the work as cheaply as the trucks, the railroads owe a debt of gratitude to any set of men who can develop a cheaper and more efficient system of transportation than now prevails. It was conceded by the railroad men present that there is undoubtedly an important field for the truck.

It was admitted that the common freight station project might take considerable time to develop, but it was stated that little relief from the present congested traffic conditions in Philadelphia can be expected until some such step is carried out.

### New England Road Builders Form Association

BOSTON, Feb. 18—For the purpose of securing, among other things, important changes of the conditions under which State highway construction is carried on, prominent road contractors have recently organized the New England Road Builders' Assn. with headquarters at 68 Devonshire Street, Boston.

The executive board, following the organization of the association, prepared a statement of requests and recommendations and submitted it to the commissioners of the highway division of the State Board of Public Works. These requests include the payment to contractors of retained percentage money held by the State and reimbursement for increased costs due to higher freight rates and greater labor costs, which were unforeseen. The contractors also ask for changes in the form of State road contracts, including a reduction of the reserved percentage to 10 per cent, acceptance of work in sections, and payment of materials stored.

### Trucks for 40-Mile Newspaper Route in Georgia

ATLANTA, GA., Feb. 23—The *Moultrie Observer*, an afternoon daily published at Moultrie, Ga., is trying an unusual experiment in the use of the motor truck for delivery purposes, the results of

which will be noted with considerable interest by the publishers of other daily papers throughout the state. A 40 mile delivery route has been established and papers will be delivered daily by motor truck over this route.

A number of smaller towns about Moultrie are located on the route and if the experiment proves successful and a money-making proposition for the paper, other routes will be established in other directions out of the city, the paper to maintain a fleet as large as it deems necessary for that purpose. Train service out of the city was not entirely satisfactory, always causing a delay in delivery, and the motor truck is being called upon as a means of solving this problem and insuring prompt delivery of each day's issue to the subscribers within 40 to 50 miles of the city.

### Removable Cylinder Sleeves in New GMC Truck Engines

PONTIAC, MICH., Feb. 24—Incorporating an engine of its own manufacture, the General Motors Truck Co., this city, is just entering production on a new line of trucks which is a revised and refined edition of the line previously marketed. The new line is made up of five models, the capacities being  $\frac{3}{4}$ , 1, 2,  $3\frac{1}{2}$  and 5-ton. The new engine incorporates the following features: removable cylinder sleeves, interchangeability of all wearing parts; removable cylinder heads and engine support arms; connecting rod bearings cast integral with the connecting rods; removable valve assembly and non-scoring piston pins.

The gearset is of exceptional interest in that it provides two-speed ranges, due to two sets of constant mesh gears, either one of which can be thrown into engagement, proving a separate speed range. Each speed range has four separate gear ratios so that the operator has a choice of eight forward and two reverse speeds. The addition of only four parts to the gearbox has provided this double range. A third lever is fitted to take care of the shift into either of the gearset speed ranges.

### Armleder Service Established in New York

NEW YORK CITY, Feb. 23—The O. Armleder Co., Cincinnati, Ohio, has opened a branch in Brooklyn at 3rd Avenue and Butler Street. A large stock of repair parts together with a full working force will be at the service of Armleder truck owners in this territory.

### Coming Events

1921

- March 1-5....Wilmington, Annual Motor Truck Show under auspices of Wilmington Motor Trade Ass'n, in Auditorium.
- March 12-19 Boston, Mass., Truck Show, Armory, Boston Automobile Dealers' Ass'n.
- March 14-17..Pittsburgh, Pa., Convention to be held at William Penn Hotel by International Retail Delivery Ass'n.

## Boston Show to Have 57 Makes of Trucks

### A Total of 236 Models Will Be on Exhibition—Large Accessory Display

BOSTON, Feb. 16—In the summary of the Boston truck show which will open in Mechanics' Building, March 12 and close on the 19th, it is stated that there will be fifty-seven makes of trucks on exhibition with a display of 236 models. Motor accessory exhibits will total 358.

The accessory display will be the largest and most comprehensive in the history of the Boston show. A number of new equipment makers will exhibit.

The truck display will be in the basement of the Mechanics' Building and also in the Armory nearby. The partial list of exhibitors shows the following makes: Acme; Ajax; Atlas; Autocar; Briscoe; Chevrolet; Clydesdale; C-T; Dodge Brothers; Duplex; Facto; Federal; Ford; G.M.C.; I.H.C.; Kelly-Springfield; Lansden; Mack; Maxim; Maxwell; Municipal; Nash; Netco; New England; Old Hickory; Oneida; Packard; Phenix; Pierce-Arrow; Rainier; Reo; Republic; Sanford; Selden; Sterling; Stewart; Traffic; Ultimate; Velie; Walker; White.

### Truck Limit Ruling Restrained in Ohio

YOUNGSTOWN OHIO, Feb. 18—Scoring a partial victory against the Mahoning County commissioners in a fight to prevent restriction of heavy duty truck operations, attorneys for the Youngstown Automobile Dealers Assn. have obtained from the Appellate Court a temporary restraining order, preventing the commissioners from enforcing their bridge weight limitations. Judge Cooper in Common Pleas Court this week dissolved a temporary injunction which he had granted 3 weeks ago. In raising the bar, Judge Cooper issued a decision supporting the rights of the county commissioners to limit the bridge weight capacities, but based this ruling on his interpretation of statutes that this action could be taken only to safeguard life and property, and that such action could be effective only for a "reasonable time" in which to carry out repairs and reconstruction.

### Fay Adopts New Type of Bus

ROCKFORD, ILL., Feb. 21—The Fay Motor Bus Co., this city, has adopted a new type of bus which was on display at the Chicago automobile show. It is equipped with pneumatic tires, radiators for heating and with seats, all facing forward.

### Correction

In the Jan. 1, 1921, specifications number of THE COMMERCIAL VEHICLE, the  $2\frac{1}{2}$ ,  $3\frac{1}{2}$ , and 5-ton Selden trucks were listed as having semi-flexible frames. The copy should have read "flexible."



# The COMMERCIAL VEHICLE

Read by Fleet Owners

THE CLASS JOURNAL COMPANY, Publisher

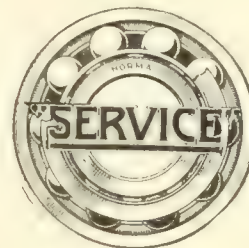
Horace M. Swetland, President

W. I. Ralph, Vice-President

A. B. Swetland, General Manager

U. P. C. Building

231 241 West 39th Street, New York



## CONTENTS

Vol. XXIV, No. 4

March 15, 1921

### LEADING ARTICLES

The Way to Solve Trucking Problems Is—To Solve Them .....	101
Simple Facts on Truck Speed and Load .....	107
Trucks Supreme in Lumber Haulage .....	110

### MISCELLANEOUS ARTICLES

Railway Demountable Bodies .....	104
Van Bodies Should Be Flexible To Retain Shape .....	105
Loading Delivery Trucks by Gravity .....	106
Are You Getting Anywhere? .....	109
Is This Your Problem? .....	112

### DEPARTMENTS

Rear Axle Repair and Adjustment—9—Schacht	
Worm-Driven Axle .....	114
The Better Way .....	118
Five New G.M.C.'s .....	122
Motor Truck Electric System Wiring Diagram .....	125
Shop Equipment, Time and Money Saved in Truck Repairs .....	126
New Accessories and Parts .....	128
The Fleet Owners' Forum .....	130
The Editor's Viewpoint .....	134

### NEWS

Store Door Delivery from Freight Cars .....	135
\$1,000,000 Trucking Concern Planned .....	135
Truck License Plan Changed .....	136
Would Limit Sale of Army Trucks .....	136

Index to Advertisers.....70-71

## The Commercial Vehicle

Charles W. Blackman, General Manager

EDITORIAL DEPARTMENT

David Beecroft, Directing Editor

Ray W. Sherman, Executive Editor

Joseph Hutton, Editor

F. E. Spooner and Sinclair Gluck

Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879.

### BRANCH OFFICES

Chicago, Mellers Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law .....	.50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

# "NORMA" PRECISION BALL BEARINGS

(PATENTED)

In the long run—with machines as with men—the honors go to the one with the greatest reserve to draw upon. An ample margin of safety is the surest safeguard when the supreme test comes. The test of hard service has always found "NORMA" equipped ignition apparatus and lighting generators adequate to the most extreme demands. They are standard equipment on the cars and trucks whose names stand for service.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

---

## *Is Your Garage Equipped for Heavy Repair Work?*

---



Heavy repairs cut huge slices into the operating profits of a fleet of trucks. Especially if you are letting high-salaried mechanics drop everything and run "to give a lift" on the heavy job.

The Canton Portable Crane and Hoist saves time and money for the fleet owner. It does the work of six men at the cost of one.

For lifting motors and other heavy parts the Canton Crane is indispensable. It puts speed and snap into the work and completely outstrips chain blocks and other hoisting methods. It is portable, has the right reach and height and requires only one man to operate it.

Fleet owners everywhere are using the Canton Crane because it will lift the large, troublesome truck motors with the greatest ease—it will support them as long as required or will place them wherever they are wanted—on the floor, on the bench or on the frame.

Send for our Catalogue E-8 and let us tell you about the Canton Crane and what it will mean to you in greater profits. Write today.

**Canton Foundry & Machine Co.**

Canton

Ohio

# **CANTON**

**PORTABLE  
CRANE & HOIST**



# *The* COMMERCIAL VEHICLE

*Read by Fleet Owners*

Vol. XXIV March 15, 1921 No. 4

## *The Way to Solve Trucking Problems Is— To Solve Them!*

WHEN you are faced with a problem in the trucking business, the way to solve it is—to take off your coat, roll up your sleeves and—solve it.

On the next two pages is the story of a small fleet owner who had problems—and who solved them in just that way.

All through his business the evidence of these problems can be seen. And the solution of these problems can be seen too.

He operates a small fleet in a small town. He had no precedent to guide him—nobody else, so far as he could tell, had solved these problems—so he took off his coat, rolled up his sleeves and solved his problems for himself.

For example, he found that the chains on his chain-driven trucks got dry, and wore out.

It was pretty clear that if the chains were oiled continually they would not get dry. Next step: "How should he oil them?"

He oiled them. He worked out a bracket running to the top of the spring hanger and curving out above the chain at the front sprocket. On this bracket he placed a big oil cup. And he saw to it that the driver opened the oil cup over each sprocket, so that the oil would run, as soon as the truck started to run.

That is how he solved that problem—just by taking off his coat and solving it.

And he solved lots of others in the same way, as the story will tell you.

When a problem comes up in connection with the trucks, the first thing to do is to analyze it until you are sure you know just what the problem involves. This analysis itself may suggest the solution.

If it does not, the second step is to look around for similar cases and see how other people have got over the difficulty. There may be another fleet



*Irving Lasher of the Spoor-Lasher Co., Poughkeepsie, N. Y. The story of how he solved his trucking problems appears on the next two pages*

owner in your own town who has solved your problem for himself.

His problem may not be just the same as yours, but his solution may apply to your case just the same, even if it has to be modified or expanded.

But if you cannot find anybody who has solved your problem, set to work and solve it for yourself, with the aid of your common sense and your good right arm and the organization about you. For there is no problem in the trucking field that cannot be overcome with these three things. And the way to solve your trucking problems is—to solve them.

Perhaps your solution may not be entirely satisfactory. Perhaps you can improve it later on, in the light of experience. But do not let that stop you from doing it now, even if your solution is only a temporary stopgap. Get the problem solved—now—and improve on your solution later if necessary.

Read the story of this man's problems and how he solved them. It may help you to solve your own.



Front view of the garage, showing the different compartments and the big yard in front for construction materials and maneuvering

# I Have No Trucking Problems!

## Why?—Because I Solve Them as They Come Up!

**P**ROBLEMS?—I have no problems with my trucks!

"I've had them, plenty of them. And I dare say I'll have plenty more of them. But I don't have them long. Why? Because I solve them as soon as they come up!"

These are the words of Irving Lasher, secretary and treasurer of the Spoor-Lasher Co., Inc., Poughkeepsie, N. Y.

A study of Mr. Lasher's business shows not only that there have been many hard problems to solve in the past, but also shows how well Mr. Lasher

has solved them. And his success in this line is of particular importance because he had, like many another fleet owner, practically no previous experience and practically no trucking precedent available on which to base his solutions.

The Spoor-Lasher Co. owns four 5-ton Mack trucks and one 5-ton Packard. These trucks are engaged on State road work for the most part, but are also employed in a certain amount of general contractor's haulage, as well as coal delivery work.

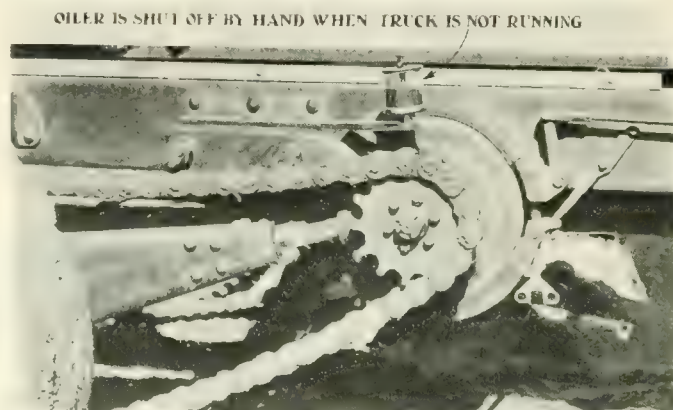
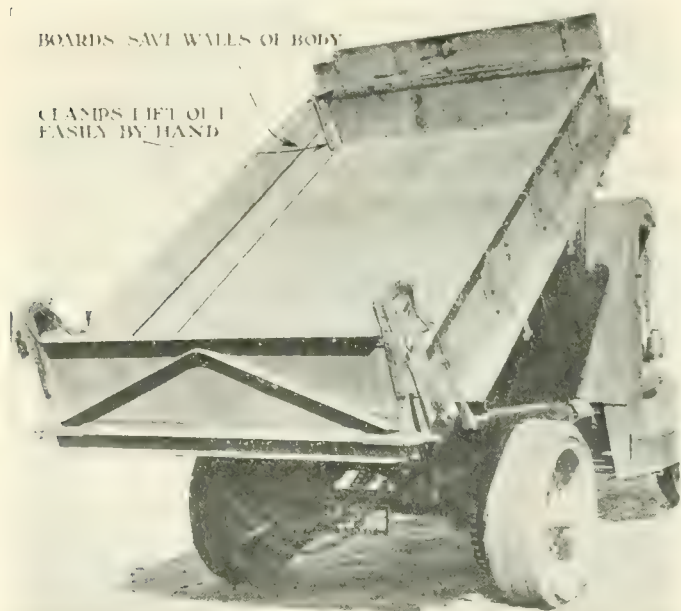
In Mr. Lasher's words, "They are running all out, from early spring until the freeze up in the fall."

During the working season about ten additional trucks are hired. But during the winter the five trucks are more than sufficient to take care of any haulage required, so that there is plenty of time during the winter for overhauling and painting them.

### There Was No Garage

One of the first of Mr. Lasher's problems was the question of a suitable garage.

The firm owns and operates, in addition to the trucks, a road grader, a mortar mixer, an asphalt heater and a steam roller, all of which required housing.



Above—The chain oiling device for keeping the chains lubricated when the trucks are running. The construction is simple, each oiler costing \$7.50, including installation

Left—One of the 5-ton Macks, equipped with boards on the inside walls of the body. The four clamps at the four corners were made in the garage and the cost of the device was the cost of the lumber



But there were many other matters which had to be considered in planning the garage. The first was the question of site. In this regard, Mr. Lasher looked ahead and bought a site where there was room enough in front of the garage to pile sand and gravel in large quantities, thus saving much of the unloaded run from the garage to the loading place. The land is also next to the creek, so that large quantities of water are available.

Next, the question of expense had to be reconciled with other requirements. The garage could not be too expensive, but it should include these features: It should be strong enough to support a great weight of snow on the roof in the winter. The pillars should be so arranged that a truck hitting one and smashing it would not cause the roof to sag. There should be a separate, locked compartment for each truck to which the driver of that truck should have a key, while Mr. Spoor and Mr. Lasher each had a master key to open any compartment. This was important, in Mr. Lasher's judgment, in fixing responsibility for missing tools, parts, etc., especially in view of the presence of the drivers of the hired trucks.

Then, also, the construction should be such that it would be necessary to heat only a small part of the garage. The roof should also be sloped, so that the melting snow would drain off readily and so that the bracing horizontal beams would serve as a support for hoisting bodies and heavy parts from the trucks during overhaul.

How well all these features were incorporated in the new garage can be seen in the two illustrations on these pages. The entire cost of the garage was only \$4,500.

### The Chains Wore Out

During the actual operation of the trucks, one of the most important problems that came up was the question of chain wear on the chain-driven Macks.

It was found that in hauling gravel and sand the chains got dry very rapidly, and while there was very little wear on the sprocket teeth, the chains themselves wore rapidly and had to be frequently replaced, at great expense.

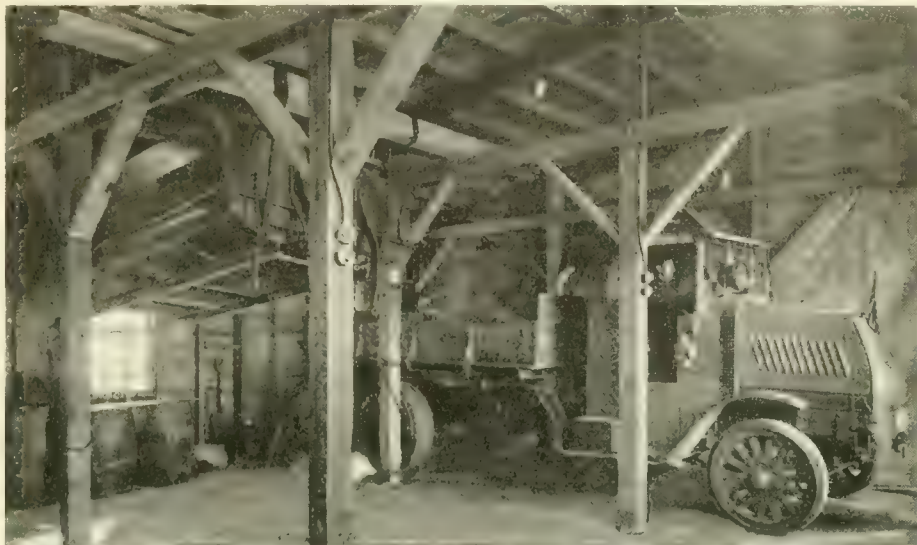
There was no precedent to guide Mr. Lasher, but instead of deciding that rapid chain wear was one of the expenses necessary in that type of haulage, he set to work and analyzed the difficulty. The chains got dry. Lubrication was needed. How could he supply it? The rest was comparatively simple. Mr. Lasher designed a curving bracket, riveted to the front spring hanger and curving over the chain and sprocket, as the illustration shows. The bracket held a large cup which was filled with oil, and which was constructed so that the oil could be shut off at night and allowed to flow onto the chains again as soon as the truck started running.

This device alone has proved a great saving in the cost of chains. The device costs \$7.50 for each cup and bracket, including installation, or \$15 per truck.

Another problem arose soon after this one. Both Mr. Spoor and Mr. Lasher believe strongly in the importance of a smart appearance for their trucks. They believe that no driver will treat his truck well unless he can be proud of it. And he cannot be proud of it unless it looks smart.

rocks, bouncing against the inside of the side walls of the bodies, were denting them outward and breaking the paint on the outside, so that it scaled off.

Mr. Lasher decided that this, too, could and should be prevented. Accordingly he placed 1-in. boards against the inside walls of the bodies and held



*The upper illustration shows a compartment temporarily shared by a Mack and the Packard. The latter is undergoing overhaul in the shop, but the body has been removed here and hoisted to the roof. Note the beam construction. The lower illustration shows the repair bench in a corner of the repair shop.*

*This compartment is heated, as the stove pipe shows*

Therefore the trucks are painted regularly once a year, the best quality of paint and lettering being used in all cases.

But part of the construction work of the trucks involve the haulage of rocks, which were dropped into the truck bodies by steam shovels. Sometimes the rock had some distance to fall, and it was soon discovered that these heavy

them there by means of clamps made of heavy band iron, curving over and fitting into brackets on the outside of the bodies. This device saved them from undue wear and premature scrapping, as well as preventing the necessity for more frequent painting.

There were other problems, too, but they were all solved the same way—by getting to work and solving them.



# Demountable Bodies for Railway Trucks

**F**ACTS which have been available for several years have shown that it costs as much to deliver goods from a railroad terminal to the consignee in New York, for example, as it does to ship the same goods by rail from Chicago to New York. While the great economic waste indicated by these facts has been allowed to continue for many years, the railway systems are now beginning to take steps to eradicate it. These steps have in the main taken the form of investigations toward the introduction of new systems of depot goods handling

and the introduction of motor trucks in place of horse wagons.

Means to reduce the time of loading and unloading have come in for a considerable amount of study in order to make the trucks economical in such work. Various demountable body schemes have been advocated as one solution of the problem, and special bodies of this nature are now under consideration by at least one of the large railroad systems in this country.

In this connection the demountable body system employed by the Midland Railway Co. in England will be of interest as a concrete example of one solution

of the problem. The Midland system, which is briefly described and illustrated on this page, has also been introduced in principle by other railroads in England, including the Great Western, the North Stafford and the North Eastern Railways, and private traders are finding the system to their advantage even if introduced in small installments.

The Midland Railway Co. was the first to recognize the advantage to be gained by a system of demountable bodies which would reduce the standing time of the high-priced motor trucks, and a trial installation quickly proved that the anticipated benefits could be secured. The whole of the fleet of motor vehicles at one station was then fitted up, and three of the tender vehicles formed from old wagons were provided for each truck.

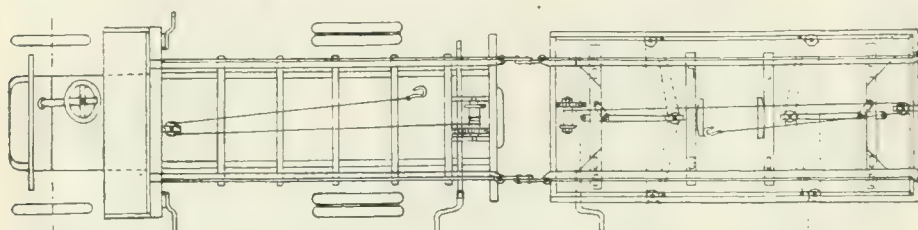
A fair average time for a vehicle to be detained in a railway freight yard for loading is from 50 to 60 min. But by means of demountable bodies, and a proper organization of their use, this can be reduced to 5 or 6 min. This, in the course of a day's work, will allow of about 30 per cent more work being done by the motor trucks.

The usual difficulties encountered in schemes for rolling platform bodies from one vehicle to another, or from a loading deck to a vehicle, are the variation in height and the impossibility of backing a vehicle quickly into a certain position, so that it will be square on and in alignment with the body to be transferred. In addition to these, it frequently happens that a transfer may have to be made on uneven ground and on a gradient, which further increases the difficulty of performing the operation with ease and in the minimum of time.

In the D.C.C. system, which is shown in the accompanying illustrations, all these points have been successfully met, and in such a manner that a driver can, single handed, deal with loaded bodies having a gross weight of 4 to 5 tons. The rails on the motor vehicle in this arrangement are fixed, and those on the trailers movable, so as to allow for the necessary alignment. The rollers on the bodies are grooved to suit the rails, but have also a wide, flat face which takes the weight in traveling and prevents the cutting of the rails, which would otherwise result from the vibration of the bodies in running.

As shown in the line drawing reproduced above, the movable frame, which is carried on anti-friction rollers, can be moved bodily across the vehicle or either end can be slewed and in either direction, so that quite a considerable amount of bad alignment can be dealt with, and the rails on the truck and trailer brought into line.

The frame is controlled by levers and light hand chains so as to give sufficient power for easy operation. Short telescopic rails are provided to allow of



Diagrammatic sketch showing the hand winches and cables for transferring loaded bodies



Beginning at the top, the three steps to remove a loaded body from a trailer pick-up wagon to a truck in railway delivery service

(Continued on page 133)



# Van Bodies Should Be Flexible to Retain Shape

**Light Weight Works for Economy in Truck Operation—Composition Board in Hookway Body Cuts Costs and Weight in Half**



*This truck made a complete somersault when going down a hill. The body and its contents were little damaged*

THE material of which a furniture van is constructed is frequently overlooked as a prime consideration of its future usefulness. Bodies for the haulage of merchandise and the moving of household goods should be purchased on different selective bases. Household goods are the more bulky and weigh less. As a result, the carrying capacity of the chassis required is too often given no consideration by the prospective buyer.

Due to the fact that in a majority of cases the weight of the ordinary van body will run as high as 4,000 lb., movers of household goods are forced to use trucks with capacities as high as 5 tons. On the other hand, had attention been given to the materials used in the manufacture of these vans, it would have been possible to carry the same size body on a 2-ton truck, with the consequent saving in operating expenses.

For the movement of household goods, a body constructed of Beaver Board is sufficiently strong and will cost and weigh about one-half as much as the ordinary body. A Beaver Board body, such as is made by the Hookway Motor Truck Co., Syracuse, N. Y., will cost around \$800 and weigh about 800 lb. A

body made of wooden panels may cost as high as \$1,500. This is a saving of \$700.

In van body construction, the prime requisite is flexibility. A body made rigid and well ironed adds considerable weight and does not permit the body to "give" with the chassis. There should be no strains on the corner pieces, risers and rafters. Though Beaver Board does not add any great strength to the Hookway bodies, nevertheless there is so much gained as a result of its light weight as to make its use worth while. Hookway bodies are built a good deal like a boat, consisting of ribs and bolsters underneath as a keel would be in a boat, thus permitting the body to move as the chassis moves.

It is stated that van bodies which are weighted down with iron do not keep their shape. Once sprung, it is impossible to get the body back to its original shape. Beaver Board bodies, it is stated, on account of their flexibility and absence of irons, hold their shape.

An instance that brought out clearly the serviceability of the Hookway body was recently brought to the attention of that company when one of its vans made a complete somersault while going down a hill. At the time of the accident, the

van was carrying a load of furniture and three men. None of the men was hurt and very little of the furniture broken. When the body was righted it was found that repairs would amount to but \$10. The body is now in use and retains its original shape. The use of this composition board instead of wooden panels saved the operator of this truck considerable expense and time, as Beaver Board can be easily replaced at a very slight expense.

The Hookway company claims that a van body should not have any heavy pads inside. Furniture should be placed inside covered with an ordinary quilt. A van body, 15 ft. long, 7 ft. wide and 6 ft. 4 in. high, will carry the furnishings and piano of any six-room apartment, and when a furniture mover carries that amount of goods, it is usually enough. A van higher than 6 ft. 4 in. cannot be operated under the average railroad bridge and cannot be piled to advantage.

The Hookway company is planning the manufacture of van bodies that will be 25 per cent lighter than those now made. One of these bodies will be 20 ft. long with doors having a 7 ft. inside width. It is estimated that this body will weigh about 800 lb.



*View of the Hookway van that made a complete somersault. This body was loaded with furniture. When the body was righted it was found that repairs would amount to but \$10*



# Loading Delivery Trucks by Gravity

*Roller Conveyors for Expediting Movement of Freight Have Been Found Practical by Fleet Owners*

**F**LEET owners using the gravity conveyor system for loading and unloading their trucks are convinced that this method is far better than that by hand. Conveyors clear the way for production and put an end to the confusion and delays that interfere with the main business of a plant.

This method of conveying merchandise saves the time of the men who formerly walked back and forth between the loading platform and the truck or

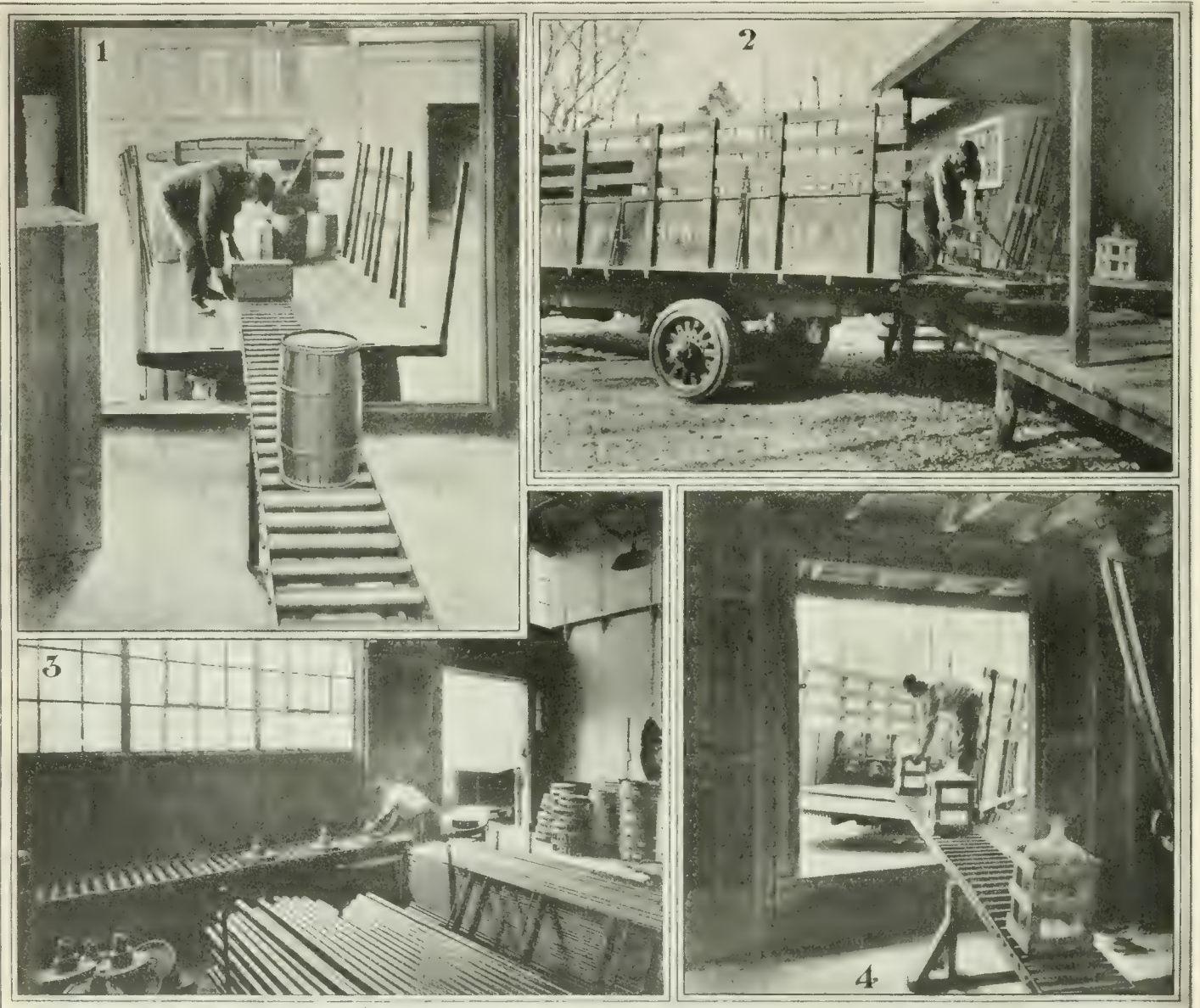
from the plant to the loading platform. Furthermore, the materials are protected from bruising, scratching and other damage, which often results in considerable loss where finished articles are trucked by hand.

The Lamson gravity conveyor made by the Lamson Co., Boston, consists of a series of lively rollers carried in a sturdy angle iron frame. When the conveyor is set at a slight inclination, packages or products placed upon its rollers move

along of their own free will, without any care or attention whatsoever.

Boxes, barrels, rolls of paper, castings, brick and tile, lumber, and all products having at least one flat surface are carried directly on the conveyor. Small parts are carried in boxes, while bags of cement and grain, rolls of cloth and products of irregular shape, are carried in simple trays or containers, or on pallets.

These conveyors are also portable and can thus be moved wherever wanted.



1—When this truck leaves the plant for a trip, one section of this portable conveyor is carried along. Upon arriving at a drug store or wholesale establishment where the boxes of medicine are to be delivered, the conveyor is run from the truck across the sidewalk to the basement window, the boxes being rolled from the truck to the receiving room. 2 and 4—Views showing the way 5-gal. carboys are unloaded. By tilting the conveyor the other way, the carboys are just as easily sent from the plant to the truck. 3—The castings in this plant were put on the conveyor at the receiving room, in this case from freight cars, but the same principle is applied when trucks are used. They flow in a steady stream past the inspector



# Simple Facts on Truck Speed and Load

## Why Careful Driving Reduces Maintenance Costs

This Article Explains What Happens to a Moving Truck in Terms That the Unscientific Man Can Understand

By R. H. Kasper

WHEN purchasing a truck, two of the main points of consideration are the speed at which it will travel and the weight which it will carry. A truck is desired which will carry a given weight at a certain rate of speed. Both are essential qualities; for if either should be eliminated the truck would be worthless. A truck which will support a great weight would be worthless if it could not move. Likewise, one which could travel at a high rate of speed would be worthless if it could not carry weight. And yet, it is these two important points which are continually working to shorten the life of a truck.

The principle is much the same as in purchasing a lead pencil. A pencil is bought to write with, and, naturally, writing wears it away. In order to make it last as long as possible it must be used in the proper manner; not for writing on a brick or stone wall as a child would do. When the necessity arises for writing on brick or stone, the rapid wear to which the pencil is subjected is readily seen. If the practice is continued, it is because the use of a pencil has certain advantages which offset the cost of a new one.

Like the lead pencil, the truck is intended to give maximum service in its intended field. The designer has carefully considered the weight which it is to carry and the speed at which it is to travel, and has proportioned the parts accordingly. To give maximum service, the truck must carry its rated weight at the determined speed. When not loaded to its capacity, or when running at a lower rate of speed than that determined, the truck is not operating at 100 per cent efficiency. The tendency of the average truck owner, however, is to overload, or over-speed, or both.

But a truck may be overloaded without being loaded to its rated capacity, and may be over-speeded when running below maximum speed. The factors of speed and load are directly related to each other, as it is impossible to change the one without altering the effects of the other. The greater the load, the slower should be the speed; and the greater the speed, the lighter should be the load.

### The Margin of Safety

Take into consideration the question of weight. The designer knows that a piece of a certain material of the required shape and dimensions will sup-

port a given weight. This has been determined by experience and experiment. But the designer is not satisfied, he adds a factor of safety, making the parts thicker or wider than is theoretically necessary. He knows that nine out of ten pieces of material of the required shape and dimensions will resist a certain strain without breaking. But he does not know how the tenth piece will act; as it may break at a fractional

### Help Your Drivers!

It is necessary for your drivers to understand WHY they must not overload and overspeed.

And if they understand why they should not do these things, they will not overspeed or overload.

And if you understand why, you will see that they do not overload or overspeed.

### Then Watch Your Costs!

proportion of the strain applied to the others. In appearance, the ten pieces may be identical, which makes it impossible to determine which is the weakest, and in order "to play safe," the designer increases the dimensions of the entire ten.

The truck owner frequently knows that the designer has provided a margin of safety. But he uses a different method of reasoning—he reasons that his truck is made from one of the first nine pieces, and being heavier than required, it is capable of sustaining a greater load than that rated. Therefore he piles it on.

While the truck is standing, the ill effects of overloading are not so great, although they exist to a certain extent. These effects are most readily seen in the springs, which are designed to give a certain amount of deflection or "spring" for every thousand pounds of load. As the load is increased, the spring deflection increases correspondingly; a double load meaning double spring deflection. A spring which is designed to carry a certain load is therefore strained when it is overloaded.

The effects may not be immediately apparent. In time, however, the spring may break, due to the fiber stresses set up in the spring steel by a greater stretching and compressing than was originally intended. These strains are also present in the axles, frame and

other parts of the truck; but, being so in a lesser degree, are not as readily apparent.

### Motion Stresses

When the truck is set in motion, a number of new strains are introduced. The force which tends to set the truck in motion is the force of the explosion in the cylinders. This force, however, is not applied at the point where it is to be used—that is, at the wheel rims. Instead, it is transmitted through the connecting rods, crankshaft, transmission, rear axle, and, finally, through the hubs and spokes to the rims of the wheels.

The connecting rods are subjected to compression strains which tend to bend them. The crankshaft, transmission and rear axle are subjected to torsional strains which tend to twist them off. If these parts are of sufficient strength and the force of the explosion is great enough, the truck will be set in motion; but to continually subject these parts to strains greater than that for which they are intended, will in time result in serious injury.

The magnitude of the strains set up depend upon the way in which the truck is started. It has been found that a load suddenly applied to a machine member will produce twice the stress within that member that the same load would produce if applied gradually. When the load is applied gradually, the stress in the member gradually increases from zero to maximum. But when the load is applied suddenly, this increase from zero to maximum is quite rapid; so rapid that the parts do not have time to yield to the force of the shock.

After the truck is started, it is subjected to still another set of strains, due to the motion of the truck and the condition of the road. Suppose that the road is perfectly smooth and the path to be traveled is a perfectly straight line. Then the only additional strains are those of rolling friction and resistance, depending on the weight and the speed.

### Turning Stresses

But it is seldom that a perfectly straight path can be followed for any great distance, and any deviation from a straight path brings in a new set of forces. When turning, the force which deviates the truck from a straight line is that which is exerted on the front wheels by the driver through the steering gear. Though the front wheels are guided to take the desired turn, the body of the truck still tends to continue on a straight path, but is prevented by the



end thrust of the axles in the hubs of the outside wheels.

This end thrust is present in both front and rear wheels, but is greater in the rear for two reasons. First, the front wheels receive the guiding force from the steering gear, while the rear wheels receive this force only after it has passed from the front wheels through the front axle, the frame and the rear axle. The rear wheels receive their guiding force somewhat later than the front wheels and are still continuing their straight course after the front wheels have turned.

Though the time which elapses between the action of the guiding force on the front and rear wheels is slight, it is nevertheless sufficient to increase the force of the blow on the rear outside wheel.

Second, though the front wheels travel in one path only, the rear wheels have a tendency to travel in two paths at the same time. At slow speed, the rear wheels follow closely in the path of the front; but at higher speeds, the momentum of the load, acting as end thrust in the outside wheel hub, tends to swing the rear wheels away from this path. This is readily seen when the rear wheels skid on turning a corner, the truck tending to swing on the center of the front axle as a pivot. This is due to the fact that the guiding force is at the front, while the greater part of the load is at the rear. The rear therefore receives the greatest force of the momentum on turning.

### Load and End Thrust

The severity of this end thrust depends upon the momentum of the truck. The momentum is proportional to the weight and the speed. To double either the weight or the speed is to double the momentum, thereby doubling the force of the end thrust.

It is here that the weight has an important bearing on the effects produced. Suppose on turning a corner, a heavily loaded truck develops a certain momentum. Now imagine a lightly loaded truck turning the same corner with the same momentum. The lightly loaded truck, in order to develop the same momentum, must travel at a higher rate of speed. The first truck develops its momentum by virtue of its weight; the second truck by virtue of its speed.

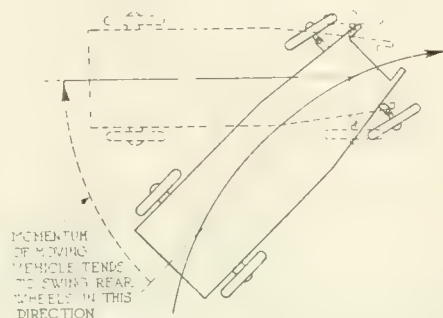
As the momentum developed is the same in both cases, it might be assumed that the effects produced will be the same. This, however, is not the case. The heavily loaded truck has greater traction on the road. The lighter may skid on the curve; but the heavier has a stronger grip on the road and therefore resists skidding to a greater extent, with the result that the outside wheels, bearings and axle spindles receive the full force of the strain. The lighter truck may round the curve with damaged tires, but it is relieved of a large part of the strain by skidding.

Perhaps the parts most frequently affected are the wheels, which can support an enormous vertical strain but are not designed to withstand exceptional lateral

strains. As a result, the wheels either collapse or develop a wobble or other weakness. If the wheel is the stronger, the axle receives the strain.

### Braking Strains

Another injurious effect of excessive load or speed is the increased braking power required to stop. Just as an increase in load makes starting more difficult, so does it require more braking pressure to stop, owing to the momentum acquired by virtue of its speed. In such a case, a greater length of time

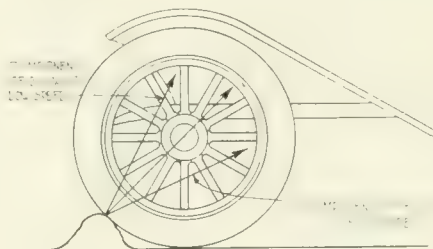


When turning a corner, the momentum of the rear of the truck is in the direction of the dotted arrow

should be allowed to bring the truck to a standstill.

In many cases, however, it is necessary to stop the truck in a comparatively short distance, with the result that the brakes are applied with increased pressure. The wheels tend to continue revolving, while the brakes make an effort to bind the rear axle to prevent its revolving. Thus, the rear axle takes the force of the road action, but in an increased degree. The spokes of the wheels act as levers, creating an enormous torsional or twisting strain on the ends of the rear axle.

So far, we have considered the road to be perfectly smooth and level. When an irregular road is encountered the ef-



As the speed increases, the direction of the force caused by striking an irregularity in the road approaches the horizontal

fects of over-load and over-speed are increased. Suppose a heavily loaded truck, running at high speed, passes over a rut. The wheels drop into the rut, followed by the body. The effect is the same as if the entire load had been dropped for that distance.

When a load is suddenly applied, the stresses are doubled; but when a load is dropped, it acquires momentum, further increasing the stresses. The wheels have no sooner reached the bottom of the rut than they rise again to come out

of it. This further increases the stresses, as the wheels and the axle are rising, while the body is still falling.

Of course, springs are provided to absorb these shocks; but though a spring will deflect when the load is gradually applied, it has been found that a sudden blow on a spring has no such effect, as the spring must have time in which to absorb the shock.

The greater part of the shock then falls on the axle, which also requires time so that the force of the blow may be distributed through it.

Lacking the necessary time, the axle must bear the greater part of the shock at its outer ends, to which the wheels are attached.

### Road Strains

The weight of a motionless truck acts directly downward. At low speeds, the condition is not greatly changed; but at high speeds the truck, by reason of its speed, develops the energy to strike a very powerful blow in a horizontal direction. This is known as the energy of motion and varies, not in proportion to the speed, but as to the square of the speed.

Thus, by doubling the speed, the energy developed is four times as great; by trebling the speed, the energy becomes nine times as great.

It is a law of physics that for each action there is a corresponding reaction in the opposite direction. Thus, when a bump or obstruction is encountered, the force of the blow is not merely delivered to the obstruction, but there is an almost equivalent reaction backward through the mechanism of the truck.

The reason that the entire reaction is not felt is that the obstruction is not of sufficient height to prevent the passage of the wheels over it; otherwise the reaction would be great enough to wreck the truck.

The higher the obstruction, the greater will be the reaction. At low speed, the force of the blow is felt in an almost vertical direction and is cushioned by the spring. But at high speeds, the reaction tends to operate more nearly in a horizontal direction or lengthwise with the body of the truck.

In this discussion, the effects of over-load and over-speed on the tires have not been considered. This is not because they are unimportant, but because the effects are more readily seen.

In the mechanism of the truck, the effects are not so readily apparent; in fact, the parts may appear as sound as when new, but the repeated strains have been getting in their work.

Metal is subject to fatigue and may be greatly weakened internally before showing any outward effects. But it is only a question of time before some of the parts will fail completely; a condition that generally happens much earlier than it is expected.

Therefore, avoid over-loading and over-speeding, except in cases of great emergency—and try to avoid these emergencies as far as possible. Remember "that he who would dance, must pay the piper."



# Are You Getting Anywhere?

Old Hammerhead Says To Make a Plan and Keep It

By  
SINCLAIR GLUCK



"LET me see," said Old Hammerhead. "You were promoted to foreman of the engine repair bench gang last week, weren't you?"

"Yes, sir," the young mechanic answered, and eyed his boss rather anxiously.

Old Hammerhead was his employees' affectionate title for Mr. Gunther, the hale old president of the town's biggest mercantile house. The old man liked to keep in close personal touch with all his employees. Hence the present talk.

Now the old man leaned back and pressed the tips of his fingers together in silence for a moment.

"I sent for you this morning," he explained at last, "because I happened to hear that you got into a scrape down on Foote Street last night—"

"It wasn't my fault!" the young fellow broke in eagerly, "I met up with a couple of fellows who'd had a drop too much. I didn't know they were going to start anything like that!"

Old Hammerhead nodded. "That's why I sent for you, Hodge. I guessed that you had been an innocent victim."

"Yes, sir," said the mechanic, considerably relieved, "it wasn't my fault."

The old man sat up suddenly. "Are you sure it wasn't?" he shot out.

"Why—why—yes, sir."

"You knew those fellows before?" the old man demanded.

"Yes, sir."

"Knew they drank?—Knew they'd been in trouble before?"

"Why—I—"

"Oh, yes you did," the old man said grimly. "The whole town knows it."

The young mechanic moved restlessly in his chair. "Yes—I knew it," he answered. "But—"

At this point the old man leaned back in his seat and a slow genial smile lit up his grim old features—a smile that the men under him knew well and loved him for. "You see, Hodge," he returned slowly. "You knew the kind of reputation those fellows have—and you know that a man is judged by the company he keeps, eh?"

"Yes, sir," answered the mechanic.

"All right. Now I'm going to tell you a little story.

"When I was a boy, I had an uncle who owned a ranch out in Wyoming. I spent a couple of summers out there and I got to know something about

horses. They're intelligent animals in some ways, Hodge, but they're pretty foolish in others.

"Take them in the wild state, for instance. In those days most ranches had a herd of horses that wandered all over the place and were practically wild. We had a bunch of them too, and you couldn't get within a mile of them—unless you knew how.

"But, my, those horses were stupid! There was an old cowboy there, who had the job of catching and taming some of them when they were wanted. When he started out after them, they knew it, and would disappear over the nearest ridge like smoke before a gale.

## Not Getting Anywhere

"But he wasn't worrying, Hodge. 'Let's see' he'd say to himself. 'They're headed for Jackson's creek. It's in flood and they won't cross it. They'll turn to the right down into the meadow, graze a spell and then light out for Pine Bluff.' That's what that old cowboy would say to himself. Then he'd give his bridle a shake and amble off for Pine Bluff.

"And that's the way it went, Hodge. Those horses would cover twenty or thirty miles, going all out. But the old cowboy would guess where they would end up when they didn't know themselves. He would ride ten miles or so and head them off. And after a couple of days of this they were all tired out and he caught what he wanted and ambled quietly home with them.

"You see, Hodge, they hadn't any plan. They just ran wherever fancy led them—and most of the time—practically all of the time—they were running in circles—and not getting anywhere.

"There's another funny thing, Hodge. We had horses on the ranch—trained

horses—that had regular duties. They got to know those duties so well that you had hardly to guide them at all. I know I slept all the way into town one day and let the horse look out for the road. But it was his regular day and he pulled up in front of the post-office on schedule time and looked round to find out why the deuce I didn't get out. A horse like that was a real benefit to the community.

"But turn one of those trained horses loose in a bunch of wild ones and what happened? He didn't reform the bunch and teach them how to get anywhere. Not a bit of it. In a month he was as bad as the rest, wandering all over the place and full of burrs, loco weed and natural cussedness.

"Now we don't want to be like those wild horses, Hodge. We don't want to go on living from day to day, with no set plan, just talking and acting as the whim of the moment dictates. We'll never get anywhere if we do.

"We've got to make a definite plan of construction for our lives. We've got to have our getaway all planned out—the getaway that's going to take us far from poverty and disgrace and uselessness. Let's make a plan, Hodge!

"And don't forget this, Hodge. You can't chase around with wild horses and get anywhere. You must have associates, Hodge. Pick the ones that will help, not hinder you. If you go with the wild ones, you'll be classed with them. And sooner or later they'll win you over to their way of life—and then you're done for.

"For the rest, make a definite plan for your life, Hodge. Make up your mind that you're going to be my general manager before you're thirty. You may not get there—but you'll get somewhere worth while! That's all, my son."



# Trucks Supreme in Lumber Haulage

## How They Brought New Life to a Failing Industry

As Forests Recede, Trucks and Tractors Form the Necessary Link with the Railhead, Operating Wherever Horses Could Go

By HAROLD F. PODHASKI

ONE of the principal factors in the logging and lumber industry of the Southeast, where most of the nation's pine lumber is produced, is transportation. In the whole history of the logging industry, transportation has always been a very important factor, but in the present day most of the South's virgin forests have been virtually hewn to their roots and the forest tracts have become so depleted that logging is now done in smaller and more isolated timber areas. Naturally, under these conditions, transportation has assumed a far greater importance than it possessed in the olden days, for the logs have to be carried to the mills from many and widely separated regions as the timber gradually gets farther and farther away from the mill.

### Old Means of Haulage Fail

The motor truck is solving this problem of transportation for the logging and lumber industry of the Southeast. With the passing of the virgin forests, the depletion of the timber tracts and the wider segregation of the timber

areas so that long hauls to the mills are necessary, the old means of locomotion—the horse, the mule or the oxen teams—is no longer possible in view of these changing conditions. The motor

### Do Trucks Help Your Business?

If you have found a means of saving money in transportation by the use of trucks in novel lines of business—

If you have worked out new and more efficient methods of truck operation in any line of business—Write THE COMMERCIAL VEHICLE and tell us about it.

Let us publish your views and your experience and—

### Help the Other Fellow

truck has proven its efficiency, economy and superiority over all other methods of transportation in the logging industry. It is rapidly assuming a very prominent place in logging methods in

this section of the country, and the time is not far distant when the motor truck will be the chief means of transportation, if not virtually the only means, for under the present conditions it offers the only solution to one of the principal problems with which the lumber industry is concerned.

### Increase in Lengths of Runs

There are a great many lumber manufacturing plants in the Southeast that are now so far away from the timber tracts where they obtain their raw material that it would be an expensive proposition, indeed, to haul the logs with teams—the cost, as a matter of truth, would, in most cases, be entirely prohibitive, and hundreds of mills would have to shut down entirely if this were the only means of transportation available.

It is really only in recent years that the motor truck has been employed to any great extent in the Southeast as a means of solving the transportation problem with which the lumber industry found itself confronted, but wherever motor trucks have been used in this regard—and they are now used to a large extent by many of the important lumber manufacturing plants in this section of the country—it has been proven that they will do a dozen times as much work as was ever possible with teams, do it far more quickly and more efficiently, and at about one-third the cost.

### Few Really Good Roads

While millions of dollars are being spent in the various Southeastern States in the building and improvement of roads, it cannot be said as yet that the section boasts good roads. As a whole, the roads can be said to be just fair, but in many sections they are very poor and especially is this true of the highways ordinarily used in the transportation of logs from the timber tracts to the mills. Hauling a several ton load of logs over a country clay road, which is the most common type of road in the Southeast, when the wheels bury themselves in many cases up to the hubs in the sticky, soggy clay, is certainly no light task. It is doubtful if the motor truck has ever been given a more severe test in actual industrial use than it has experienced in the transportation of the fresh-cut logs from the heart of the pine forests of the Southeast to the mills. And so far, at least, as the lum-



This truck and semi-trailer hauled daily from 25,000 to 30,000 ft. of spruce logs, a total which would have required a large number of mules or horses to equal. Moreover, where forests have receded far from the railheads, truck transportation is far more rapid and more reliable than the old method of haulage, and the trucks can go anywhere the horses could go



ber industry of that section is concerned, the motor truck has proven its worth and unquestionably solved the problem of transportation.

Most people might naturally be of the opinion that it would be necessary to haul the logs to a road or a highway before they could be loaded onto a motor truck. However, lumbermen have learned that a motor truck will go almost anywhere that a team of horses, or mules or oxen will go, and it is nothing unusual at all for a motor truck to be driven into the very heart of the forest where the timber is being cut and to load right there.

### Creepers Tractors for Swamps

Of course, this is not always possible, and especially is this true in the Southeast where swampy and soggy land is perhaps much more common than in some other sections of the country, but, nevertheless, motor trucks are every day accomplishing unusual feats in the pine forests of this section that a few years ago would have been deemed virtually impossible. Where the logs do have to be hauled through swampy and soggy ground, many of the mills have used creeper tractors to great advantage. But tractors are more or less slow, and they are used only where conditions are such that the trucks cannot possibly accomplish the purpose.

Now, then, as to actual performance on a comparative basis with the old methods, R. W. Walker, president of the R. W. Walker Lumber Co., Salisbury, N. C., is authority for the statement that one motor truck of 7½-ton capacity hauls each day as large a quantity of logs as formerly was hauled by twelve teams, and at about one-third the cost. Consider the fact that this transportation is mainly over country clay roads, and the proof of the motor truck's supremacy in this regard surely needs no further emphasis.

### Motor Truck Solves Problem

The Walker Lumber company was one of the first manufacturers of lumber in this section of the country to turn to the motor truck as the only means of solving its transportation problems under the conditions which existed, and we can take it, therefore, that Mr. Walker is about as qualified to speak on this subject as any other lumber man in the Southeast. He said:

"We put in more time with our truck during the winter months than we ever did with our teams. In other words, any number of days our teams were standing in the barn and our truck was making the regular trips.

"We have some pretty stiff grades, but we have never experienced any serious trouble. In fact, we had so much reserve power that we decided to attach a trailer to our truck, so we bought a 5-ton trailer. We haul on the truck about 1200 feet of logs and about 800 feet of oak logs on the trailer. Our average load on the truck and trailer is 2200 feet, and this would equal in dry lumber something over 10,000 feet.



*A sample of the type of road on which the trucks must haul their heavy loads of logs. Although this is hard on the best of trucks, it is equally hard on horses, and the trucks get through where the horses fail. In swamps where even trucks cannot go, the work still goes on, the logs being hauled away from their virgin fastnesses on creeper tractors*

In fact, we have had on our truck alone 6800 feet of poplar lumber, and the truck was not loaded as heavily as some of the log-loads we had."

Discussing the matter further, Mr. Walker said:

"Before we got our truck it took about thirty teams to keep our mill logged. A short time after we got our truck

we cut our mules down to twenty-five head, keeping a few teams on the road hauling to the mill and some in the woods bunching the logs for the truck."

At present the company has virtually done away with its animals and uses only a few in bunching the logs and bringing them out to a convenient place for loading onto the trucks.

## A Test for Any Truck

THE haulage job shown in the illustration below would be a pretty severe test for any truck, not only because of the weight of the log itself and the consequent strain on the chassis and springs, but because the truck is naturally forced to operate in ground and on roads that

are comparatively soft. On such roads the tremendous weight of such a load as this log causes the rear wheels, wide as they are, and the center two wheels to sink far into the ground, so that the drawbar pull strain of haulage is very much increased.



*The claim is made that this is the largest log ever carried on a motor truck up to date when the photograph was taken, some months ago. The diameter of the log at the butt was about 10 ft. and the total weight was approximately 42,000 lbs., or 21 tons. Note the division of the weight between the four heavy wheels, leaving almost no weight on the front wheels*



# Is This Your Problem?

**With Only 58 Full Days of Work Each Year Truck Still Proves Cheaper Than 4 Mules, Per Ton-Mile. An Interesting Comparison of Truck Costs Under Unfavorable Conditions**

NO one needs to prove nowadays that the motor truck, working somewhere near its highest efficiency, is more economical than the horse, per ton hauled and per ton-mile. This is an established and generally recognized fact, for the motor truck has come into its own.

But careful cost figures will sometimes show that the motor truck is more economical than horses or mules when it is worked at far below maximum efficiency.

Therefore, the many men in many industries who could not operate a truck all the year round, or could not operate it fully loaded all the year round, will still do well to make a careful analysis of what a truck would cost them and compare the result with what horses actually do cost them. For in spite of adverse conditions, replacing their horses or mules with a truck may still save them money.

The following is a case in point:

Edwin B. Weyland of Heards, Va., hauls between 1000 and 2000 tons of fruit, slack, cooperage and orchard supplies annually. Up to recently he employed four mules in this work.

The mules actually worked about 200 days per year. But during many of these 200 days the mules were put to work, not because they could be worked at a profit, or because there was enough work to keep them busy, but because they cost less if they were working than if they were idle.

When idle, the mules cost \$5.22 per day. On slack days it was always possible to get \$3 worth of work out of them. But when working they cost \$7.60 per day. Therefore, they actually cost when working \$7.60 minus \$3 or \$4.60, a lower expense than the \$5.22 they cost when idle. This is the reason for working them at a loss.

## Truck Works 58 Days Only

It must be remembered that the conditions under which these mules were operated were peculiar. At certain rush seasons, such as the harvest season for fruit, efficient transportation was absolutely essential. But at other seasons it was scarcely needed at all.

But in spite of this fact, Mr. Weyland determined to try out his haulage with a truck and get rid of the four mules.

Accordingly he bought a 3-ton chain-drive White truck, and got rid of his mules.

The yearly costs on the truck have been estimated from the facts and figures quoted by Mr. Weyland, and

have been laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks, as shown on these pages.

Mr. Weyland states that his truck ran 2160 miles in 5 months, when winter set in and closed the roads. A steady, reliable driver was selected with a particular view to insuring thorough lubrication and no overloading.

In running the 2160 miles, the truck hauled 378 loads aggregating a total weight of 2,028,710 lb.; used 635 gals. of gasoline and 95 qts. of cylinder oil. Average length of run was 5.7 miles.

But unlike the mules, the truck was much less costly when idle than when running, so that when it was not essential to do any hauling the truck could be left idle for weeks together without the

The Commercial Vehicle—Truck Cost System			
Year		Month ending Dec 31, 1920	
Make of truck		White (Chain Drive)	
		Gasoline Electric	
U. P. C. BOOK COMPANY, INC. 243 249 WEST 39TH ST. NEW YORK			
MONTHLY COST SUMMARY SHEET			
Operating Charges			
Gasoline	635 gals.	\$ .32	\$ 203 20
Current	kw-h	\$	
Oil	95 qts.	\$ .30	28 50
Grease	lbs.	\$	
Kerosene	gals.	\$	
Waste	lbs.	\$	
Dist. Water	gals.	\$	
Driver	58 days	\$ 2.25	130 50
Helper	days	\$	
Mechanic	hrs	\$	
A—Total Operating Charges			\$ 362.20
Maintenance Charges			
*Tires	2160 miles	\$350 per 7000 miles	\$ 108 00
Repairs	2160 miles @ \$4.00 per 10,000 miles		86 40
Overhauling, painting, etc.			
Spare vehicle rental			
Garage rental (pro rata)	@ \$5 per month		60 00
B—Total maintenance charges			\$ 254.40
Fixed Charges			
Insurance, fire	1 1/2% per year on \$5000		\$ 75 00
Liability	per year		
Collision	per year		
Interest	6% (On Item 1—+2)		300 00
Depreciation on chassis	@ 50,000 mile life		187 92
Depreciation on body	@ 25,000 mile life		25 92
Depreciation on equipment	@ 25,000 mile life		
*Depreciation on tires	@ \$18 per year		18 00
Total taxes and licenses			
C—Total fixed charges			\$ 606.84
			1223.44
*Note: Omit one of these			

Yearly costs of a 3-ton truck, operating only 58 days in the year, laid out on a sample sheet of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. Many of these costs depend upon the amount the truck is operated, while a few, such as interest, will not vary with the amount of work done



proportional loss suffered in the case of the mules.

Mr. Weyland states that the truck averaged 37 miles per day when operating. But if this figure is divided into the total mileage we have only 58 full days of running as a result.

Therefore, this 58 days has been taken as the days operated for an entire year, running 2160 miles in the year and the total yearly costs and the cost per ton-mile during the year estimated on that basis for the purpose of making comparisons with the cost of the mules.

## Truck Cheaper Per Ton-Mile

It will be noted that many of the yearly costs, as shown on the sheet on page 112, depend on the amount the truck is operated. The first three operating charges cover only 58 full days of actual operation during a 5-month period, and this cost remains the same no matter whether the 58 days work

is done in 5 months or 1 year. Similarly, with the first two maintenance charges,

## What the System Costs

On these two pages are shown filled-in sample sheets of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

## The Commercial Vehicle—Truck Cost System

Number of Truck

Capacity in lbs. 6000

Chassis No.

MONTHLY COST SUMMARY SHEETS

U. P. C. BOOK COMPANY, INC. 241-249 WEST 39TH ST. NEW YORK

### Investment

Cost of chassis, less tires	\$4 350.00
Cost of body	
Cost of equipment	300.00
Cost of tires	350.00
1 Total cost, complete	\$5 000.00

### Performance Record

2 Days operated	58
3 Days idle	307
4 Days maintained (Item 2—Item 3)	365
5 Total hours operated	464
6 Total miles covered	2160
7 Total trips made	378
8 Total tons <del>or packages or stops</del>	1014

### Performance Averages

9 Average miles per day <del>maintained</del> (Item 6—Item 4)	6
10 Average miles per day operated (Item 6—Item 2)	37
11 Average miles per trip (Item 6—Item 7)	5.7
12 Average tons, <del>stops or packages</del> per trip (Item 8—Item 7)	2.7
13 Average commercial ton-miles, <del>package miles or stop miles</del> per trip	7.7

### Recapitulation

14—Total expenses for <del>year</del> month (Sum of Items A, B and C)	\$ 1223.44
15—Cost per day operated (Item 14—Item 2)	\$ 21.09
16—Cost per day maintained (Item 14—Item 4)	\$ 3.35
17—Cost per mile operated (Item 14—Item 6)	\$ .57
18—Total commercial ton-miles, <del>package miles or stop miles</del> (Item 7×Item 13)	2911
19—Cost per commercial ton-mile, <del>package mile or stop mile</del> (Item 14—Item 18)	\$ .42

Performance Record, Performance Averages and the recapitulation of the cost figures on the 3-ton truck operating under the most unfavorable conditions. Although the truck operated only 58 out of 365 days, or about 16 per cent of the time, the final cost per ton-mile, \$0.42, is cheaper than with mules, which is \$0.51

tires and repairs, which are based on mileage. But the charge for garage rent is based on time.

Under Fixed Charges, insurance, interest and taxes are on a time basis, while the two depreciation items are based on mileage. This brings the total for Fixed Charges of \$606.84, out of proportion to the other two totals.

Altogether the truck, on a basis of 2160 miles to the year, a very disadvantageous estimate, costs a total of \$1,223.44. Turning to the right hand sheet on page 113, the total days operated are only 58, the mileage covered 2160 miles, the trips made 378, and the tons hauled 1014 tons. (Items 2, 6, 7 and 8.)

These figures give the average miles per trip as 5.7; the average tons per trip as 2.7, and the average commercial ton-miles as 7.7 per trip. (Items 11, 12 and 13.)

Finally, the total commercial ton-miles is 2911, and dividing this figure into the total yearly cost of \$1,223.44 gives a cost per commercial ton-mile of \$42.

Thus, although operating far below highest efficiency, this truck cost \$0.09 less per commercial ton-mile than the mules previously used.

Here is a statement of the cost per year of owning and operating the four mules:

Interest at 6% on \$700, first mule cost at \$175 each	\$12.00
Depreciation on 4 mules, \$700 in 10 years	70.00
Interest at 6% on \$200, first cost of wagon, etc.	12.00
12 tons of hay, at \$85	120.00
64 bbls. of corn, at \$7	448.00
Feeding (done by stock man) 260 days at 20c	52.00

Total fixed charges per team per year \$1,044.00

Fixed charges per team per day (200 days) \$5.22

### OPERATING COSTS PER DAY

Depreciation on wagon, harness, etc., \$200 in 1000 days	\$0.20
Shoeing, repairs, etc., \$3.60 per month of 20 days	.18
Driver (exclusive of feeding), \$2 per day	2.00

Total operating costs per day \$2.38

Fixed charges per day \$5.22

Operating costs per day 2.38

Total cost per day \$7.60

The four mules covered an average of 15 miles per day, which is 3000 miles in a 200 day year. The average length of run was 5.7, so that the mules covered roughly 526 trips. They averaged 2 tons per trip, giving a total tonnage of 1052 tons.

Multiplying the average miles per trip 5.7, by the average tons per trip 2, and dividing by 2 gives the average ton-miles per trip, or 5.7.

Multiplying this figure by the total number of trips, 526, gives the total commercial ton-miles per year for the four mules, or 2998.

Multiplying the daily cost, \$7.60, by 200 gives \$1,520 for the total yearly cost, and dividing this figure by the total ton-mileage, 2998, gives \$.51 for the cost per ton-mile with the four mules.

# Rear Axle Repair and Adjustment

*A Series of Articles to Assist Maintenance Superintendents in Carrying on Axle Repairs*

## 9—Schacht Worm-Driven Axles

**T**HE maintenance and repair of the Schacht worm-driven rear axle as used on the line of trucks made by the G. A. Schacht Motor Truck Co., Cincinnati, Ohio, may be divided under the heads of worm wheel and differential adjustment, wheel bearing alignment and brake relining, the latter being greatly simplified by the mounting of only one brake, the emergency, on the rear axle. The foot brake is of the propeller shaft type mounted amidships on a heavy cross member.

In the Schacht axle the worm is mounted above the worm wheel, and the worm wheel and differential are mounted as a unit in a cast steel carrier, which is bolted in place in the center housing of the axle. With this design, the removal of these units does not necessitate taking the axle from under the truck. Radial and thrust loads are taken upon large annular and thrust ball bearings. The lower half of the worm wheel runs continually in a bath of oil, the worm wheel carrying the lubricant up to the worm and ball bearings.

### Adjustments

The center distance of worm and gear is fixed and needs no adjustment. About every 6 months the worm shaft and thrust bearing should be examined for end play. The thrust bearing should be clamped firmly, but not so tight that the balls will be crowded, causing the bearing to bind. Should any end play develop in this bearing, the removal of one of the

### Axles Described in Previous Issues

*Maintenance superintendents who wish to refer to articles on axles that have already been described will find them in the following issues:*

1920

1—Timken.....Nov. 1

2—Clark.....Nov. 15

3—Packard.....Dec. 1

4—Wisconsin...Dec. 15

1921

5—Ford (Bevel)

Jan. 15

6—Ford (Worm)

Feb. 1

7—Sheldon....Feb. 15

8—Walker....Mar. 1

9—Schacht..This Issue

worm. The bearing retainer on each end of the differential is provided with a ring-nut which has a number of slots cut in it. To adjust, it is first necessary to slightly loosen the clamps over the bearing retainers. The taper pins holding the ring-nuts in place should then be taken out. The worm gear may now be shifted into the desired direction by loosening the nut on the side toward which the gear should move and tightening the ring-nut on the opposite side. A spanner wrench should be used on the nuts as a punch is very likely to ruin the slots.

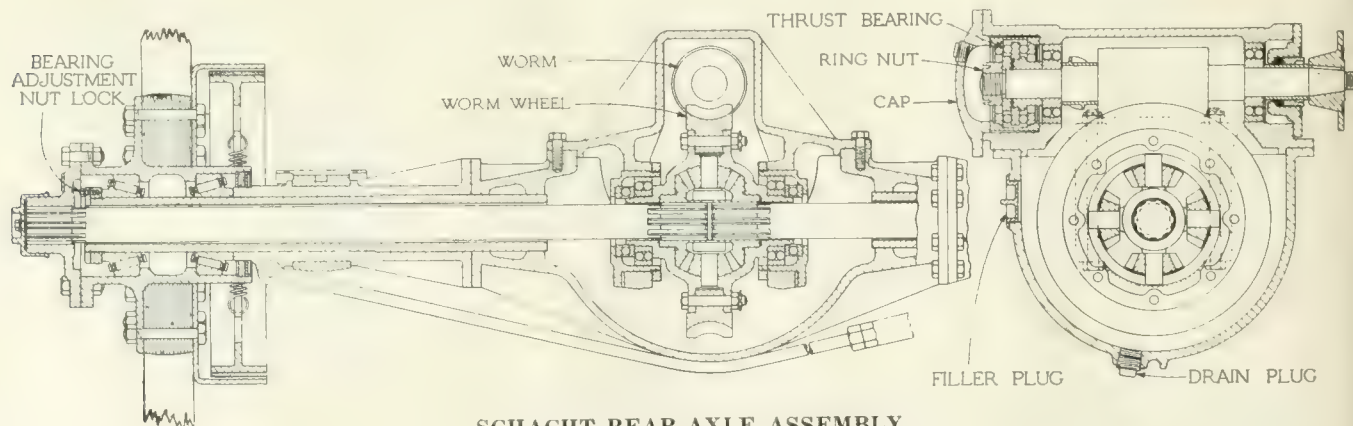
Proper tooth contact may be determined by cleaning the worm and gear thoroughly, applying a very light coat of Prussian blue or red lead to the gear, and noting the area of contact of the worm with the gear. This will be shown by the places where the blue or red is rubbed away. Adjustment should be made so that the contact will be even across the tooth both on the forward and reverse side. The adjustment having been made, the nuts should both be evenly tightened so that the nearest slot will be aligned with the taper pin holes. Replacing the pin locks the nut in position. The clamps over the differential bearing retainers should now be tightened down firmly and the job is complete.

### Differential

The removal of the differential is greatly facilitated if the body of the truck is removed so that the worm and gear housing may be lifted upward by a crane or tackle. However, this is not absolutely necessary. In proceeding

two or three gasket shims under the cap which holds it in place is usually sufficient to again clamp it enough to prevent its rotation.

The horizontal position of the worm gear may be adjusted with great accuracy to obtain proper tooth contact with the



SCHACHT REAR AXLE ASSEMBLY

*This type of axle is used on 2, 2½ and 3½-ton trucks. In the Schacht axle the worm is mounted above the worm wheel and the worm wheel and differential are mounted as a unit in the cast steel carrier*



with this work, the following operations should be carried out:

1—The axle shafts must be partially withdrawn by removing the hub caps and pulling each shaft out about 1 ft.

2—Disconnect the driveshaft by removing the ring of bolts which hold the universal joint to flange on worm shaft.

3—Loosen the worm and gear housing from the axle housing by removing the ring of bolts and cap screws in the large flange where the two fit together.

The worm and gear housing may now be lifted out of the axle housing. The differential is held in this unit by two clamps over the bearing retainers with four long bolts. Removing these bolts allows it to be completely taken out.

### Wheel Removal

The removal of the wheels is as follows:

1—Jack the rear axle up high enough to allow a board with two small rollers under it to be placed under the wheel.

2—Remove the hub cap by taking out the cap screws which fasten it to the hub flange.

3—Withdraw the axle shaft which has the driving dog on its outer end.

4—Remove the bearing adjustment nut lock.

5—Remove a small steel block which is held in place by a cap screw and which prevents the adjustment nut from turning.

6—Unscrew the adjustment nut with a special wrench in the tool kit which is provided for this purpose.

The wheel may now be withdrawn from the axle tube. The elevation of the wheel should be such, that when it is withdrawn, it will rest on the board and rollers as soon as the outer wheel bearing slips off of the axle tube. The rollers will then carry the weight of the wheel, making the removal easy.

### Brakes

In relining the brakes, the wheels must first be removed. In removing the brake shoes, proceed as follows:

1—Remove brake shoe spring.

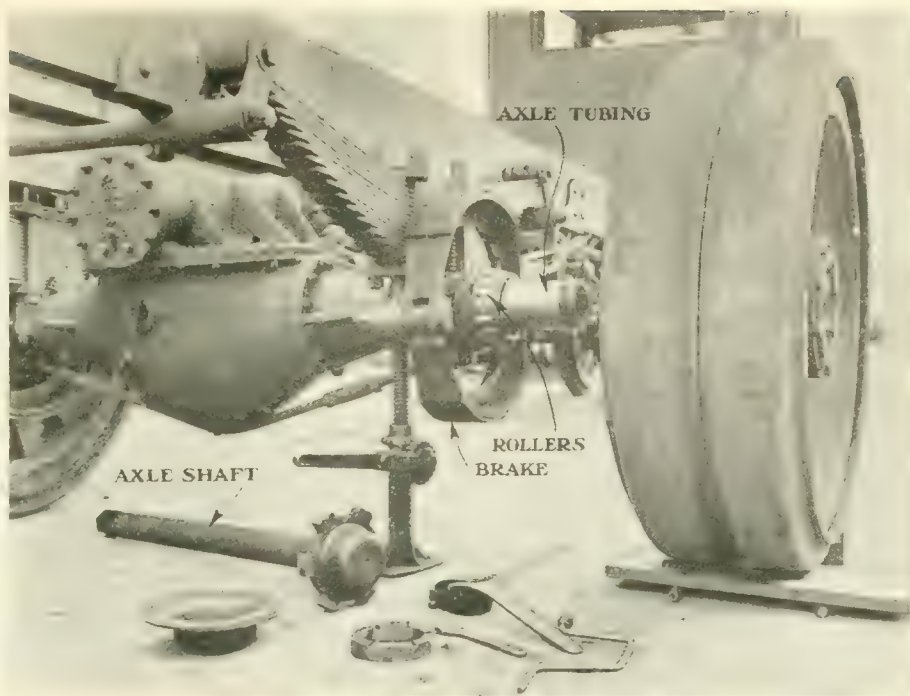
2—Remove the grease cup in the stud which supports them at the rear side.

3—Unscrew the lock nut which holds the stud in the axle arm.

The shoes may now be removed together by driving out the stud just mentioned. The lining is held in place by copper rivets and its installation is a matter of common knowledge. Care should be taken, however, that the heads of the rivets are well countersunk in the lining to prevent their coming in contact with the brake drum. The shoes are replaced by driving the stud back into its original position and replacing the lock nut and grease cup. Replacing the wheels completes the job.

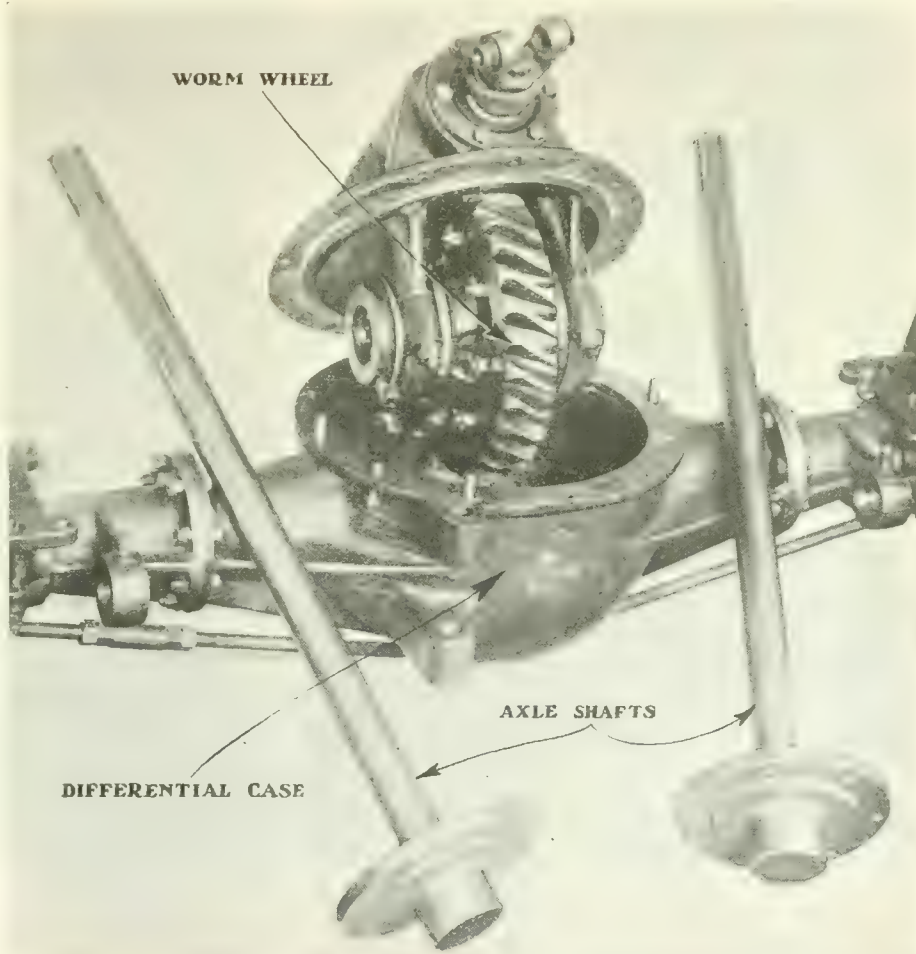
### Wheel Bearings

The adjustment of the wheel bearings is accomplished with the wheel jacked up off the ground, the hub cap, axle shaft and adjusting nut lock removed as described in the removal of wheels. The adjusting nut is tightened with this spe-



### REMOVAL OF WHEELS

*This view shows the tool equipment that should be used in taking off the wheels on a Schacht rear axle. The rollers under the wheel make its removal easy. Note the driving dog at the outer end of the axle shaft*



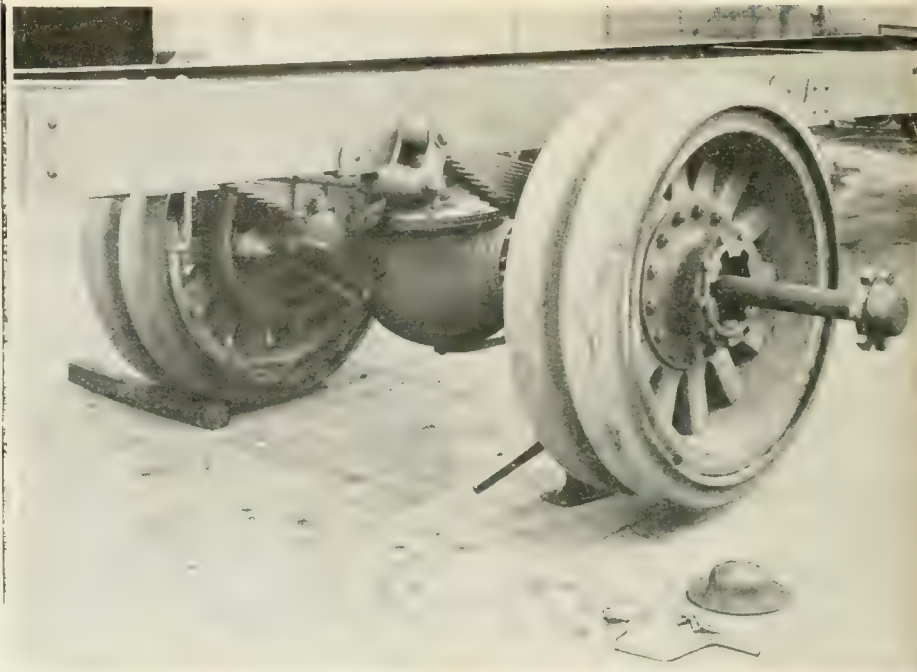
### REMOVAL OF WORM

*View of the worm and gear housing after it has been loosened from the axle housing by the removal of the ring of bolts and cap screws in the large flange where the two fit together.*



cial wrench as tight as it can be drawn by hand, and then backed off until the next slot in the nut corresponds with the position of the lock. It is important to note that if the tight position of the nut places it in the right position for locking, it must nevertheless be backed off an amount corresponding to the difference of one slot on the nut. The nut may then be locked, the axle shaft and hub cap replaced and the adjustment is complete.

The wheel bearings are lubricated by forcing grease into the hub with a grease gun, the later axles being fitted with an Alemite grease fitting and the earlier ones having a pipe plug in the opening. These bearings should have attention once a month. The worm and gear, the differential and the worm thrust bearing should be lubricated with special worm oil. The axle housing should be cleaned out and refilled after the first 500 miles until the oil just runs out of the oil level hole, and thereafter every 2000 miles. The worm thrust bearing should receive attention once a month. It is lubricated with worm oil through a hole in the thrust bearing cap which is provided with a pipe plug. It is very important that the worm, gear and thrust bearing be properly lubricated to prevent excessive wear and heating.



#### WHEEL BEARING ADJUSTMENT

*The adjustment of the wheel bearings is accomplished with the wheel jacked up off the ground, the hub cap, axle shaft and adjusting nut lock removed. The adjusting nut is tightened with the special wrench*

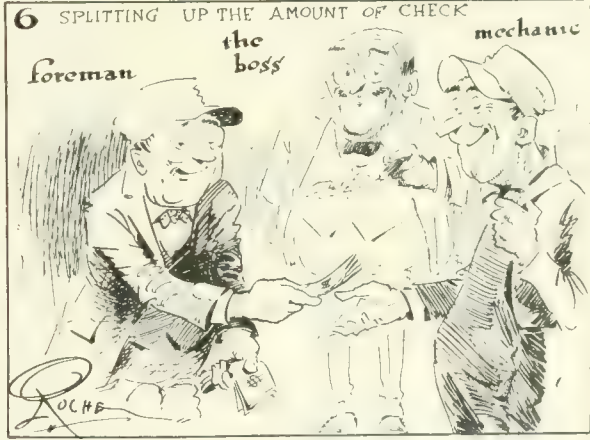
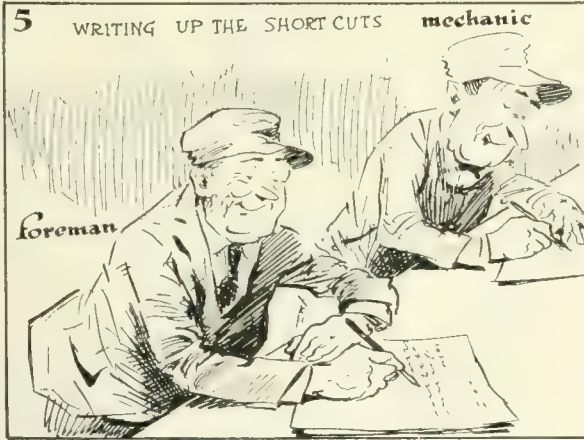
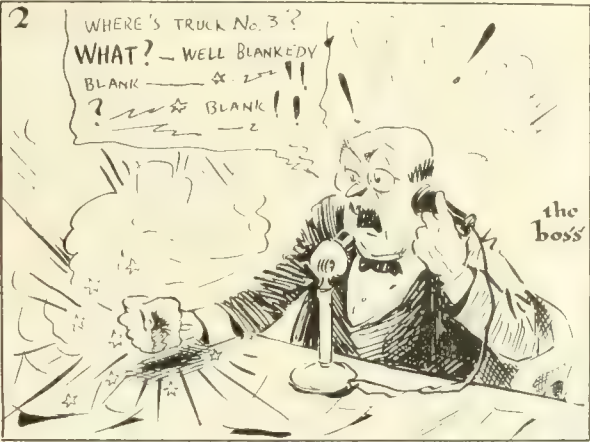
## Crane with Magnet Reduces Labor Cost



*This 4-ton Union is operated as a crane in unloading and loading heavy metal pieces from railroad cars. The crane is equipped with a magnet, the current for which is supplied by a generator placed under the seat. The box on the body is provided for tools and other equipment. The rated capacity of the crane, which is made by the Bay City Foundry and Machine Co., Bay City, Mich., is 6000 lb. at a radius of  $7\frac{1}{2}$  ft. The crane is equipped with power hoisting, power slewing, power radius varying arrangement, complete with operating levers and brakes for holding the load in any position. Power for the crane is derived through the power take-off on the gearset. Folding outriggers reduce the strain on the truck chassis when the crane is lifting off the side of the truck. These outriggers are of the folding type and can be raised or lowered by use of the screw jack arrangement*



# WHY NOT YOU?

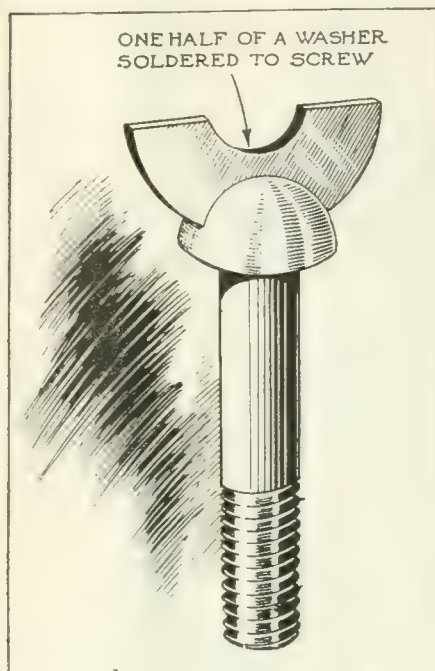


**Send Us Your Ideas and We'll Send  
You Our Money. One Dollar for  
Each Sketch and Short Description**

**THE COMMERCIAL VEHICLE  
239 West 39th St.  
New York City**

# The Better Way

*To Save Time in Truck Repair and Maintenance*



No. 400—Thumbscrew

## No. 400—Useful Home-Made Thumbscrew

ON most truck engines there are certain bolts which require frequent adjustment if the truck is to maintain its highest efficiency as regards smooth running qualities. A more accurate adjustment of these bolts as regards tightness and direction may usually be obtained with the hand rather than with a screw driver. For this purpose a home-made thumbscrew may be constructed in the manner shown in the accompanying illustration. To construct the device, saw a

**T**O help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

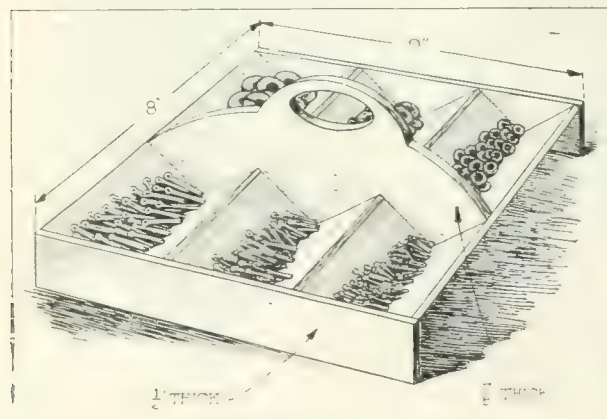
metal washer in two pieces and solder one half in the slot of the bolt as shown. The sawed edges of the washer may be filed off to prevent their cutting the fingers. Bolts of this type are often in position difficult to get at with a screwdriver so that this thumbscrew will prove a convenience in this way also, and in general, tightening bolts in this way, with the hand rather than some tool will save considerable time.—PAUL H. KOENIG, Scudders Gale Grocery Co., St. Louis, Mo.

## No. 401—Tray for Nuts and Cotter Pins

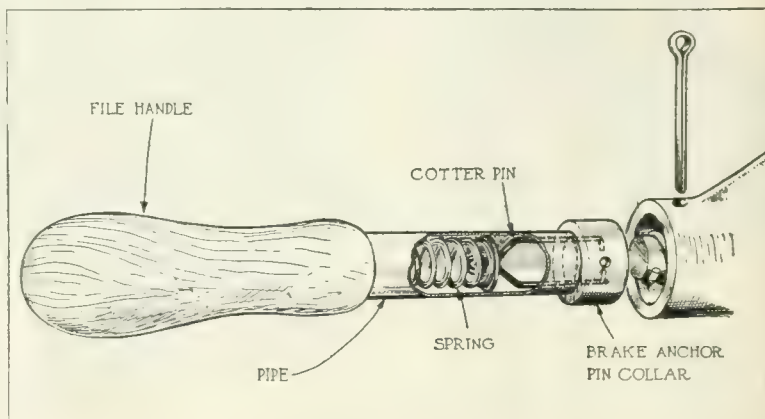
IN the accompanying illustration is shown a convenient little tray for use on the repair bench. It is divided into six compartments and designed to accommodate and segregate the different sizes of nuts and of cotter pins. As shown, the tray is provided with a handle to facilitate carrying it from place to place. The overall dimensions of the tray are 8 by 9 inches and it is constructed of half-inch boards. The handle, however, is made of  $\frac{3}{4}$  in. board. Every mechanic who has wasted time in looking all over the repair bench, and eventually applied to the stock room, for a certain size of cotter pin or nut will recognize the advantage of having such a tray at hand when it is wanted. Moreover, the tray as shown is very simple and inexpensive to construct.—S. J. MARKS, North Broad Street Garage, Woodbury, N. J.

## No. 402—Tool for Brake Anchor Pin Collars

THE tool shown in the accompanying illustration is designed especially for the purpose of setting brake anchor pin collars, and will be found a great convenience for this work. The construction of the tool is as follows: To a wooden handle is attached a length of iron pipe, and inside this pipe is a spring which is attached to the head of a cotter pin by means of a metal washer through which the cotter pin is passed. The cotter pin is then bent in the manner shown. The construction of the tool and its method of application are indicated in the illustration.—A. G. RAABE, Long Island City, N. Y.



No. 401—Bench Tray

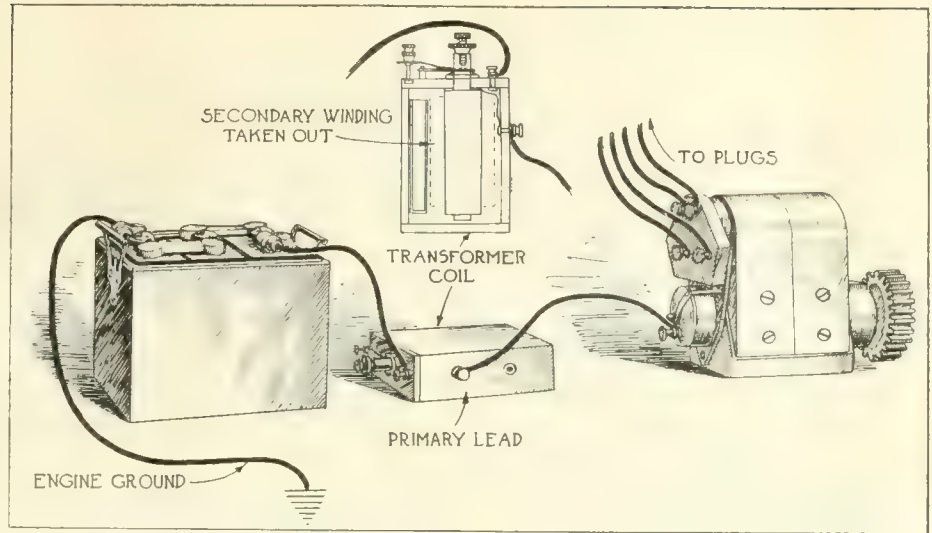


No. 402—Brake Tool



### No. 403—Shop Uses for Small Vibrating Coil

A VIBRATING coil of the Ford type is a big help in a repair shop, being useful for many different operations. It can be used to detect short circuits in the wiring of the trucks; it will tell whether a wire is broken anywhere; it can be used to make sure that the proper connection has been made through various types of apparatus, etc. But it has been found of primary value in one shop at least for starting some of the larger trucks which are equipped with a high tension magneto for ignition. For this purpose the coil is simply hooked in series with the magneto and battery, whereupon any high tension magneto is rigged up to start on the battery. The writer cut the secondary winding off of an ordinary coil unit of a Ford truck and used the primary and the vibrator to break up the current. The coil was made as follows: Take a coil unit, dig out a little of the wax, and then cut the secondary winding with a knife, being careful not to touch the primary winding or condenser. Take out all the secondary winding if possible, although if a little remains it will not interfere with the proper working of the apparatus. When this is completed, solder a binding screw onto the two primary terminals and seal up the coil again. The method of construction and connection with the battery and magneto is shown in the illustration. —WALTER F. DAASCH, Davenport, Iowa.



No. 403—Uses for Vibrating Coil

ends of all the nuts of this type and locking the nuts in place by means of cotter pins would take a lot of time and is, moreover, unnecessarily complicated. Where it is usually unnecessary to remove the bolt once it has been placed in position, as in the case of fenders, the nuts may be locked on the bolts in the manner shown in the accompanying illustration. Bolts which are long enough, such as small stove bolts, are locked in position by sawing the end of the bolt part way and then, after the nut has been put on, spreading the end of the bolt apart as shown. This is a safety method which may save a lot of expense in future repairs as well as prevent really dangerous conditions.—A. W. BROOKS, K. W. Auto Co., Raymond, Wash.

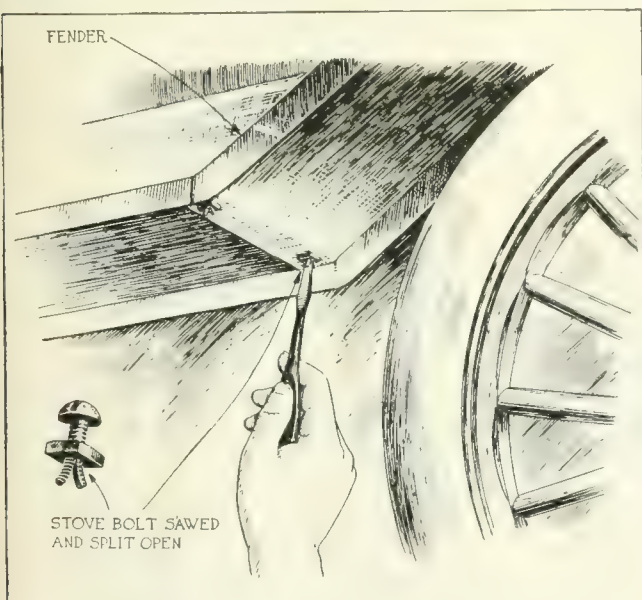
case the installation of a new Ford Universal gasket is a simple matter. But the occasion may easily arise when it becomes necessary to install a new universal gasket, because of a serious leakage from the universal joint housing. In such cases, the gasket may be easily installed by means of the method suggested in the accompanying illustration. The requirements are a section of 2 by 4 timber and an ordinary jack. The end of the 2 by 4 beam is placed against the rear axle housing while the other end rests against the end of the jack. The head of the jack rests against the motor hanger. Raising the jack will now separate the joint sufficiently to allow the operator to install the gasket. The latter is cut on the bias, to allow the ends to pass the universal joint. If difficulty is experienced in bringing the wood and the jack together the two may be rested on a wooden box or other handy object. This device will save a lot of time in the operation.—C. C. HIGINBOTHAM, Hawkeye Garage, Marshalltown, Iowa.

### No. 404—How to Lock Fender Bolts

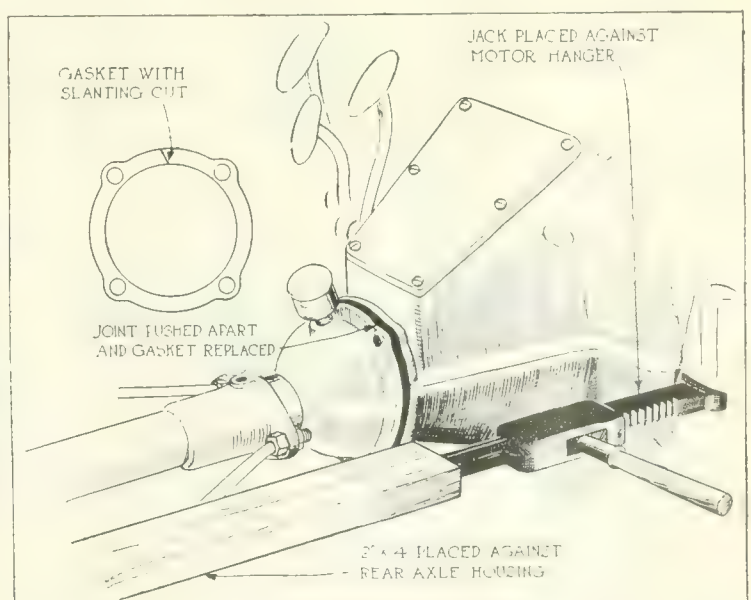
THERE are many different parts of a truck where small bolts are used, such as the fenders, etc., where a good deal of difficulty is experienced through the vibration causing the nuts to unscrew and fall off. This results in the loss of the nut and bolt, and may even result in serious damage if it is not noticed in time. Boring holes through the

### No. 405—Installing Ford Universal Gaskets

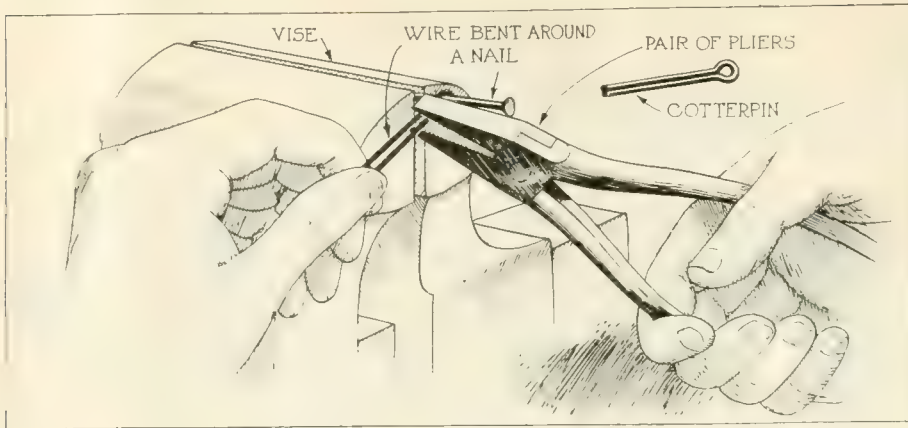
NEW gaskets may be and usually are installed when the engine and gear-set assembly are disassembled, in which



No. 404—Locking Fender Bolt



No. 405—Installing Gaskets



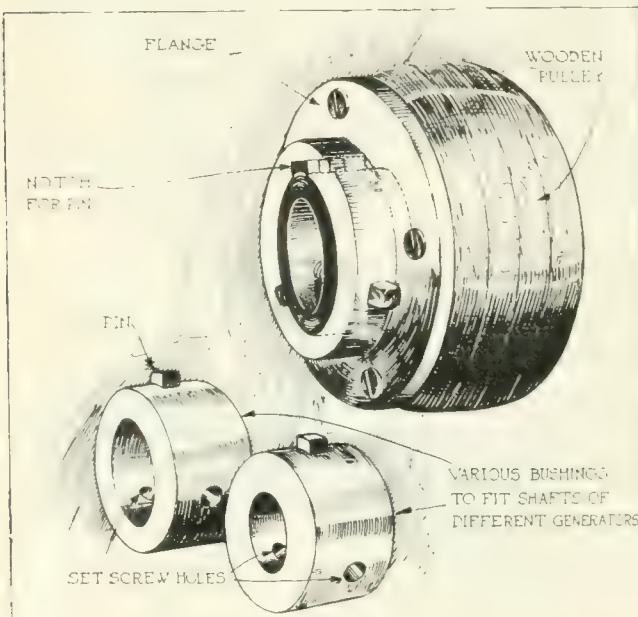
No. 406—Making Cotter Pins

### No. 406—An Easy Way to Make Cotter Pins

THERE are many cases in which a particular size of cotter pin is essential for the proper completion of a repair job. Nothing is more exasperating on such an occasion than to find that the job cannot be completed because the proper size of cotter pin cannot be found or is temporarily out of stock. Undue delay arising out of such a situation may be avoided by constructing a cotter pin of the correct size after the manner indicated in the accompanying illustration. The method has the advantages of being simple and quickly accomplished. Place a large nail in the vise so that the head projects some distance horizontally. Then select a piece of wire of the proper thickness and bend it around the upper part of the nail as shown. The two sections of wire can be pressed together into a cotter pin with a pair of pincers. The ends of the wire can then be cut off to make a cotter pin of the required length. When this is completed the ends can be brought to a point with a file.—PAUL H. KOENIG, Scudders Gale Grocery Co., St. Louis, Mo.

### No. 407—Pulley Used for Testing Generators

IN garages where a number of different makes of trucks of various capacities are used and where the trucks are equipped with starting and lighting systems, it will be necessary from time to time to test the generators when the trucks are disassembled for overhaul. As the generators and generator shafts may be of different sizes and as the generators may be removed from the engines, some means must be devised for connecting up the different generator shafts with a testing device or driving mechanism. Such a connecting device is shown in the accompanying illustration. It consists of a wooden pulley for the driving belt, to one side of which is attached a flange as shown. The interior of this flange is notched for a pin and bored for a set screw. It is designed to fit a number of bushings which have all the same outside diameter, but different inside diameters to fit different generator shafts. Each bushing has a pin which fits the notch in the shoulder of the flange. When the required bushing is inserted in the flange the generator shaft is inserted in the



No. 407—Adjustable Pulley

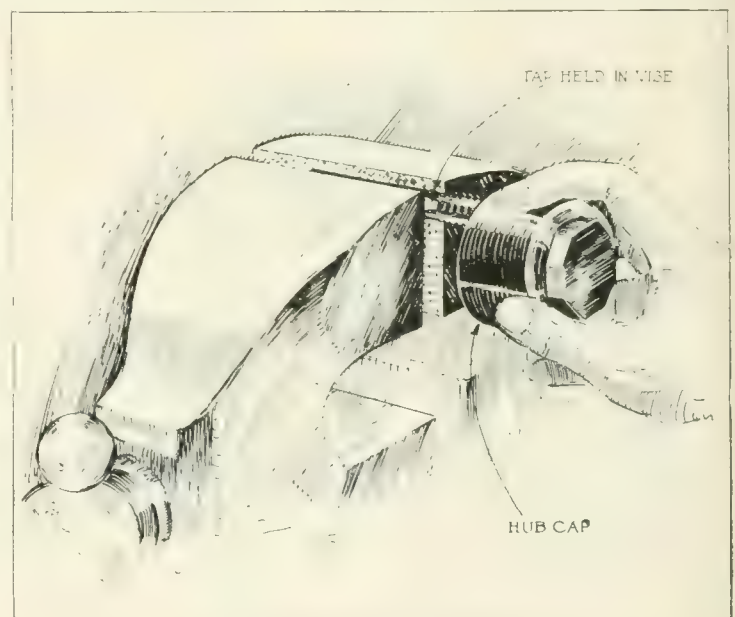
bushing in turn, and both bushing and generator shaft are held firmly by means of the set screws. This will avoid the necessity of constructing different pulleys for each different size of generator shaft.—J. K. BAL, Auto Electric Co., Milwaukee, Wis.

### No. 408—Renewing Threads in Truck Hub Caps

IT is very important that the hub caps on trucks should be refilled with grease at frequent intervals, especially if the truck is constantly on the road. If this is not done any amount of damage may result; for example, the bearings may get hot and seize, and this may result in the wheel coming off, causing a serious accident. However, the constant removal and replacement of these hub caps causes severe wear on the thread, especially as the hub cap wears slightly loose, when the tendency increases to replace it with the threads crossed. These threads may be renewed by turning the cap on a tap of the proper size, as shown in the accompanying illustration. The tap should be clamped in a vise during the operation. The same method may be employed in renewing the threads on the radiator cap.—C. M. JENKINS, Dodge City, Iowa.

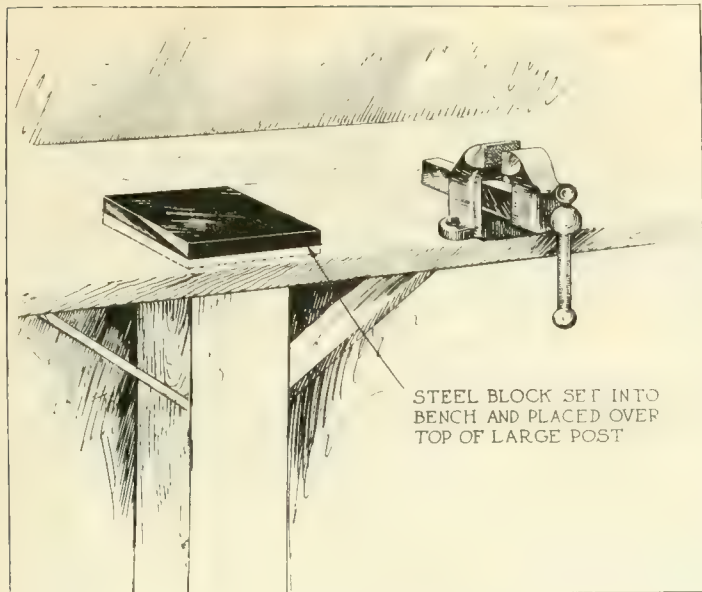
### No. 409—Steel Bench Block Saves Vise

IN the everyday course of repairs in the repairshop, especially when work is being carried on with a certain amount of haste, the mechanic who finds it necessary to hammer some small article naturally makes for the jaws of the vise as a surface on which to rest the article to be hammered. This means that after the vise has been used in this way a few times the jaws or other part on which the small article is rested will be dented and damaged and the vise will be less perfect and efficient. To avoid the use of the



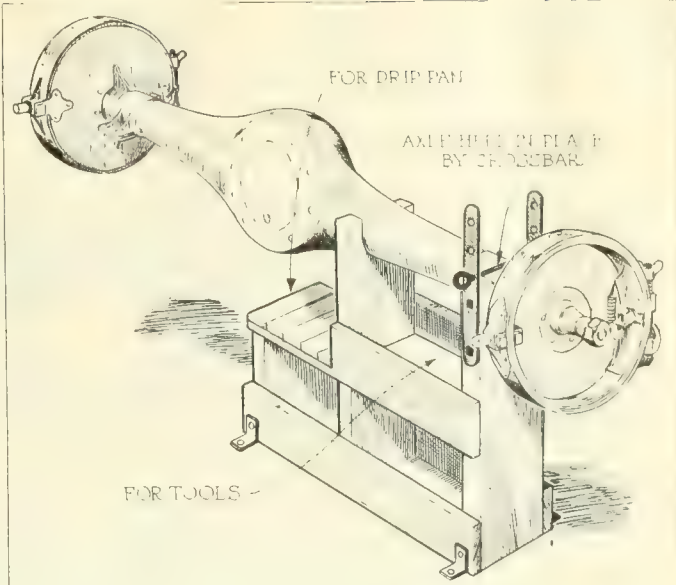
No. 408—Renewing Hub Caps





No. 409—Steel Bench Block

STEEL BLOCK SET INTO BENCH AND PLACED OVER TOP OF LARGE POST



No. 410—Axle Repair Stand

FOR DRIP PAN

AXLE HELD IN PLACE BY CROSSBAR

FOR TOOLS

wise in this way, a square steel block may be set into the top of the repair bench in the manner shown in the accompanying illustration. If possible, the block should be set immediately above a supporting post, so as to avoid spring in the bench block. If necessary another post may be placed underneath the bench.—CHARLES H. WILEY, Concord, N. H.

### No. 410—Repair Stand for Truck Rear Axle

THE construction of this handy rear axle stand is shown in the accompanying illustration. It is approximately 2 ft. high as shown but this dimension may be varied to suit the convenience of the operator. It is made 5 or 6 in. longer than one-half the total length of the rear axle assembly, in order to keep it from tipping over. It will be noted that the rear axle is kept in place by a cross-bar consisting of a steel pin run through holes bored in the iron uprights. There are a number of these holes to fit different sizes of axles. One part of the stand serves as a tray for tools while another may be used to hold a drip pan when emptying the differential case. It will be noted that the stand can be bolted to the ground if desired, for greater steadiness in working on the axle.—R. M. BARKDOLL, W. E. Dineen Garage, Cheyenne, Wyo.

of the spark plug with the instrument, for the purpose of removing the carbon. The thickness of the blade, 1/32 in., permits it to be used for adjusting the points of the plugs. But, aside from its use in connection with spark plugs, this little instrument will prove of value in innumerable instances around the repair-shop. For instance, it can be used to scrape wire for connection, for removing the carbon from the cylinder heads, for scraping old shellac from the gaskets and for many other purposes.—CARL M. EPKE, 459 Palmwood Avenue, Toledo, O.

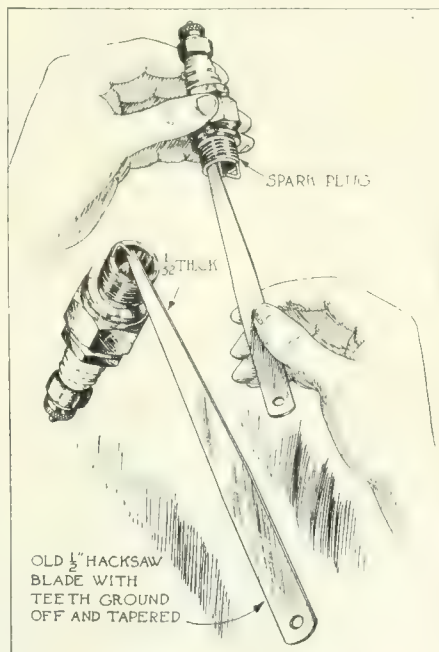
### No. 412—Tool to Remove Obstinate Bushings

THE accompanying illustration shows a handy tool used to remove bushings which are stuck fast and which require replacing. The device consists of

a hard steel rod about 1 ft. long and about 3/8 in. in diameter, or preferably, a tapered rod 3/8 in. to 5/16 in. in diameter. The tool is ground off at an angle at the cutting end and is ground off square at the hammer end, as shown in the illustration. The tool will either remove the bushing at once, or, in case the bushing is very tight, it will split it sufficiently to allow it to be removed. The point of the tool "hogs" in but not into the part bushed, because in all cases the part bushed is harder than the bushing. The point of the tool should be placed at the extreme outer edge of the bushing to be removed. This point can easily be reground when it becomes dull or is turned over. The tool will remove not only the small bushings, but also bushings 2 or 3 in. in diameter with equal ease.—WM. H. ROEHRIG, Ford Repair Shop, Utica, N. Y.

### No. 411—Old Hacksaw Blade for Spark Plugs

A VERY useful little tool which can be employed for many little jobs around the repair shop can be made from an old 1/2 in. hacksaw blade in the manner shown in the accompanying illustration. The tool is made from a worn-out 1/2 in. hacksaw blade, 1/32 in. thick. The teeth are ground off and the edge which is left is ground square to a scraping edge. It is ground in such a way that the tool tapers to the end. This long taper permits the user to get into the very top

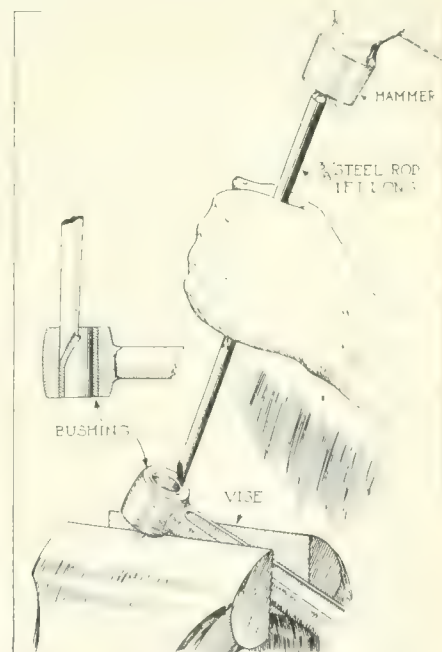


No. 411—For Plugs

OLD 1/2" HACKSAW BLADE WITH TEETH GROUND OFF AND TAPERED

SPARK PLUG

1/32" THICK



No. 412—Bushing Tool

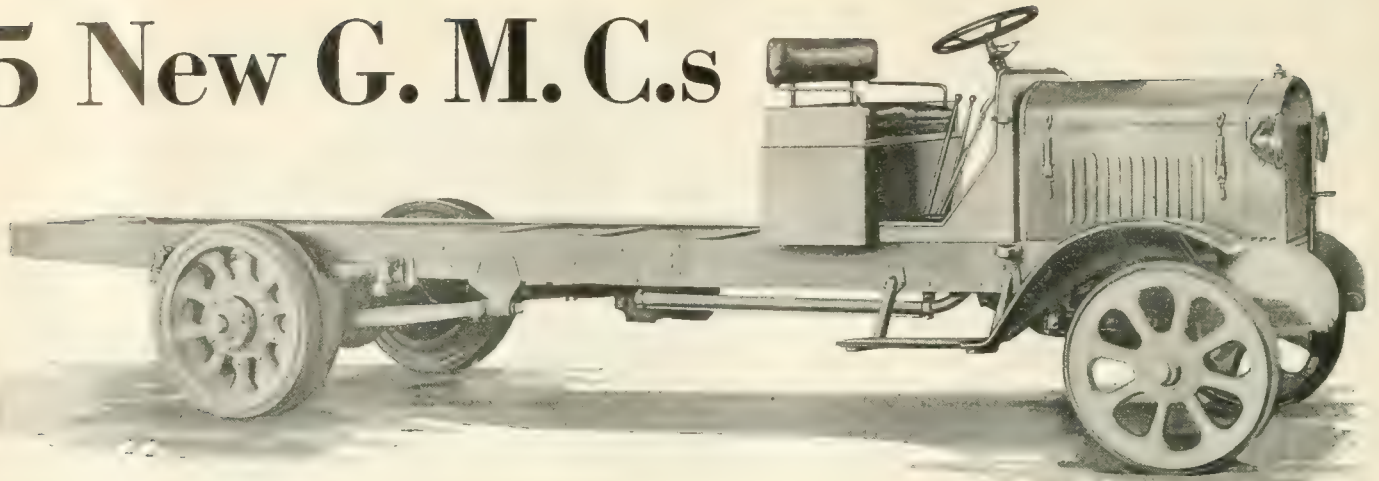
HAMMER

STEEL ROD TAPERED

BUSHING

VICE

# 5 New G. M. C.s



The new 5-ton G. M. C. truck whose appearance is typical of the other heavy trucks

**Features of Line Include a New Engine with Removable Cylinder Sleeves and a Gear-set with Two Speed Ranges—Pulling Power Has Been Increased 30 Per Cent**

INCORPORATING an engine of its own manufacture, the General Motors Truck Co., Saginaw, Mich., is just entering production on a new line of trucks which is a revised and refined edition of the line previously marketed. The new line is made up of five models, the capacities being  $\frac{3}{4}$ -, 1-, 2-,  $3\frac{1}{2}$ - and 5-ton. Three engines, all of similar design and all products of the General Motors plant, take care of this line of five trucks, the same engine being used in the  $\frac{3}{4}$ - and 1-ton and another engine taking care of the  $3\frac{1}{2}$ - and 5-ton sizes. The 2-ton uses an intermediate size.

Designed with an idea of furnishing uninterrupted transportation to the purchaser of the truck, the General Motors vehicles incorporate a great many features which are of particular interest from the maintenance side. The new engine may be said to have been designed for the purpose of keeping maintenance cost as low as possible and to keep the truck tied up for as short a time as possible when repairs do become necessary. In other words, the fundamentals behind the design of this truck engine are closely wrapped up with the thought that the cost to the truck owner of having his vehicle laid up for a week or two may be much more serious than the actual charges for the repair bill and, consequently, as the description will bring out, this engine has been designed very largely from the standpoint of facilitating repairs and adjustments when they become necessary.

As compared with the old line of G. M.

## G. M. C. Truck Specifications

	$\frac{3}{4}$ -Ton	1-Ton	2-Ton	$3\frac{1}{2}$ -Ton	5-Ton
Price .....	\$1,645	\$1,995	.....	.....	.....
Wheelbase .....	132 in.	132 in.	146 in.	163 in.	163 in.
Tires, front.....	33 x 4 $\frac{1}{2}$	34 x 5	36 x 4*	36 x 5*	36 x 6*
Tires, rear.....	33 x 4 $\frac{1}{2}$	34 x 5	36 x 7*	40 x 5 Du	40 x 6 Du
Bore, in.....	3 $\frac{1}{2}$	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$	4 $\frac{1}{2}$
Stroke, in.....	5 $\frac{1}{2}$	5 $\frac{1}{2}$	5 $\frac{1}{2}$	6	6
S. A. E., hp.....	19.60	19.60	25.60	32.40	32.40
Speed, r.p.m.....	1485	1485	1220	1250	1260
Speed, m.p.h.....	25	25	18	17	16
Gear ratio in high gear.....	6 to 1	6 to 1	7.25 and 7.79 to 1	8.75 and 7.17 to 1	10 and 6.28 to 1
Final drive.....	Bevel	Bevel	Worm	Worm	Worm

\*Solid.

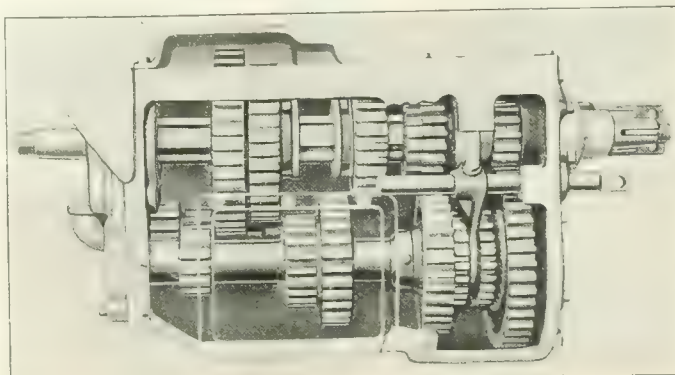
C. trucks, the new line is faster and more powerful. Heretofore, the design has been principally laid out with the idea of supplying sufficient power for all circumstances. In addition, the speed factor has been incorporated in the present models with the idea that the present road and transportation conditions make the factor of speed as important as that of power.

The engines are higher speed, and this, in connection with a specially designed gearset, with an additional countershaft reduction, provides double the number of available gear ratios and, consequently, widens the range of performance and gives a flexibility to the vehicle which was unapproached in the previous models.

The new G. M. C. engine which, as a design proposition, makes an interesting study, both from the standpoint of ease

of maintenance and of power development, incorporates some new features as far as truck engines are concerned. Some of these features are removable cylinder sleeves, force feed lubrication, superheated high velocity intake manifold, interchangeability of all wearing parts, removable cylinder heads, removable motor support arms, connecting rod bearings cast integral with the connecting rods, combination thermosyphon and pump cooling system, removable valve assembly and non-scoring piston pins. These points indicate in a number of instances a study of reduction in maintenance time.

Probably the most interesting feature of the engine is the removable cylinder sleeve. These sleeves are gray iron castings, machined inside and outside to very close limits. The advantages claimed for this type of construction are: first, inter-



Two-range gear set used on the five new G. M. C. trucks. The two sets of gears are in constant mesh



changeability; second, ease of replacement; and third, elimination of misalignment of the cylinders because of shifting of cores in casting. From the maintenance standpoint, should a cylinder wall be scored through lack of lubrication or any other cause so as to necessitate replacement, it is possible to make such replacement in 4 hr., as compared with 10 days to 2 weeks tie-up with the ordinary regrinding methods. Not only does this provide a saving in service cost,

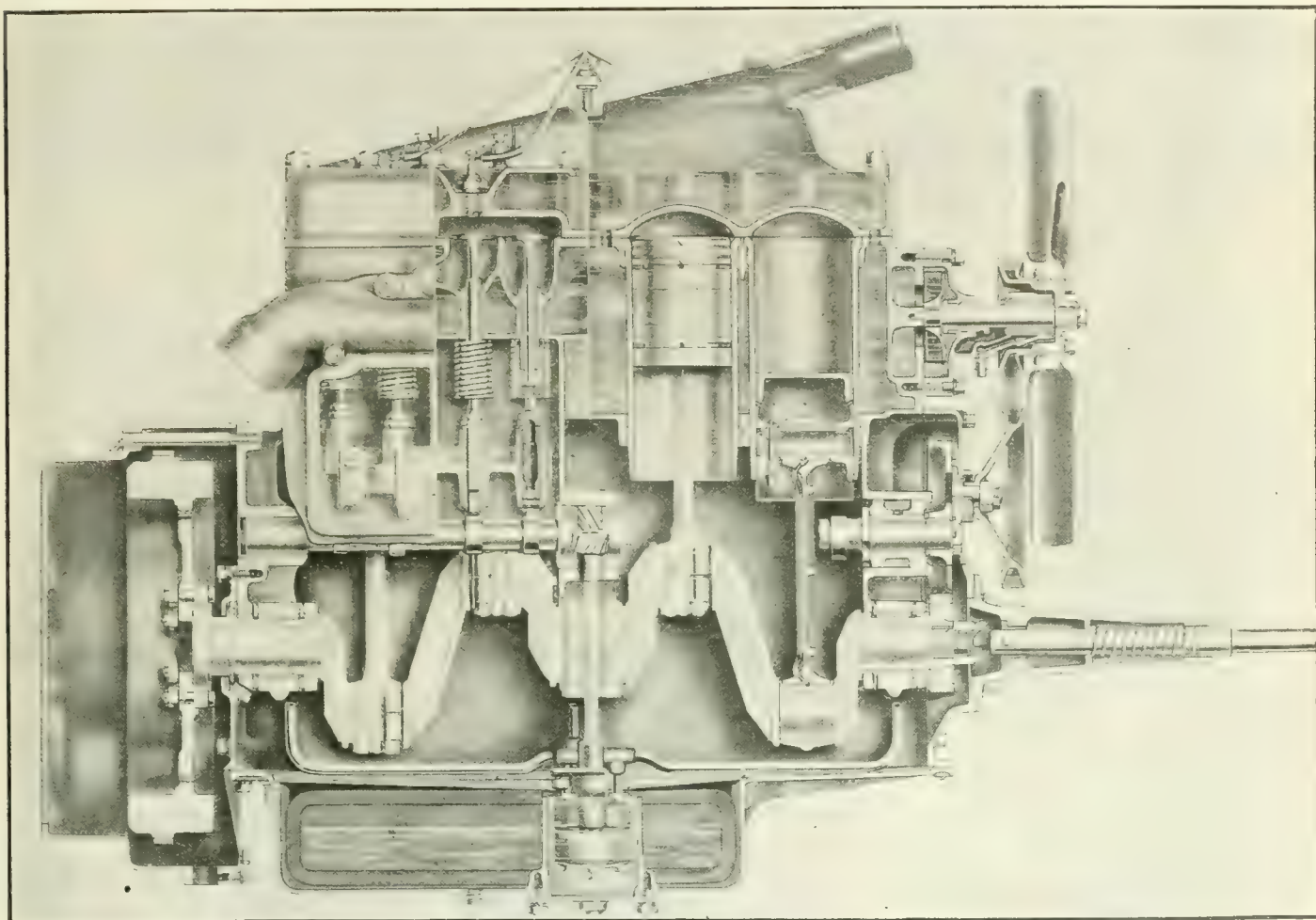
made large so as to provide a large body of water over the valves and combustion chamber.

The cylinder block and crankcase are cast in units of semi-steel and the block has a feature that there are no wearing parts attached to it or part of it which are not replaceable, with the single exception of the valve seats. These are provided, however, with sufficient metal for reseating the valves many times in excess of their requirements during the

that might take place in the joint, as the spring provides an automatic take-up. The front support of the engine, which forms the third point, is a collar on the starting crank housing which is bolted to the timing gear cover. This suspension point is also protected by the spring and clamp method to compensate for misalignment.

The non-scoring feature of the piston pin, which has previously been mentioned, consists of a bronze plug inserted

## Sectional View of New Engine for G. M. C. Truck Line



*Note the detachable cylinder sleeves, excess amount of water in circulating system and pressure feed oiling*

but also a reduction in the lay-up time of the truck.

The replacement of these sleeves becomes an easy matter with a special tool which resembles very closely a wheel puller used to withdraw them from the block should it become necessary. By means of this tool and by following instructions issued by the makers, it is possible to make the replacement in 4 hr. as indicated, which is a big step in cutting down maintenance time on truck engines as far as cylinder regrinding is concerned.

The separate cylinder head casting is of semi-steel and is readily removable for access to the combustion chamber, valves and piston heads. The heads are

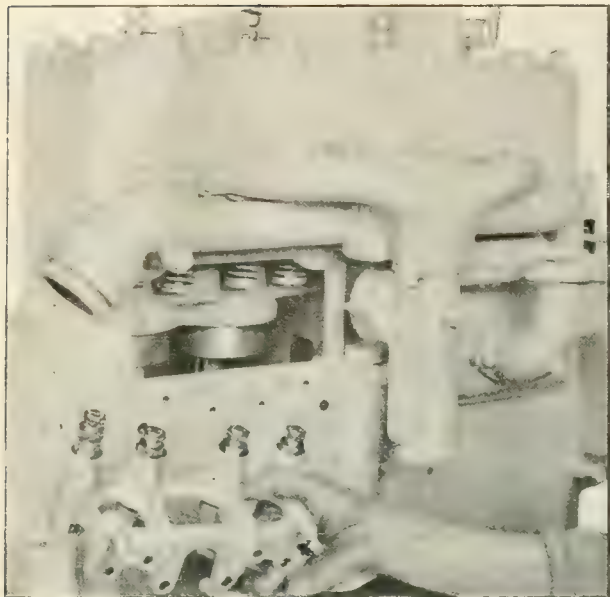
life of the engine. The valve seats are cast integrally with the block and in the casting the excess metal for reseating the valves is allowed.

The engine is suspended on the three-point principle, ball and socket mountings being employed in the two rear supports. This mounting is in conjunction with the semi-flexible frame construction. The ball and socket joint is held together by a bolt that passes through the joint and extends below the engine hanger far enough to enable the mounting of the heavy coil spring. In addition to the three-point suspension, this method permits of yielding in the event of excessive distortion of the frame. It also is designed to compensate for any wear

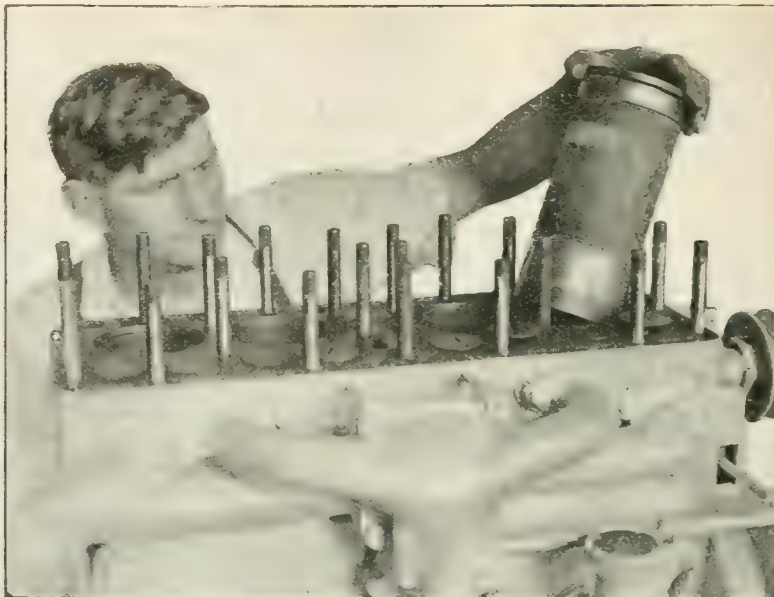
in the end of each piston pin. This metal is exceptionally soft bronze so that in the event of the pin working its way into contact with the cylinder wall it could not score it.

The connecting rods are drop forgings of high carbon steel, the upper end being bored and reamed and provided with a bronze bushing forming the bearing on the piston pin. The lower end of the rod and cap are electro-copper-plated after being machined. The end is then tin-plated, after which the bearing metal is cast integrally with the rod. This method of construction is used because of the impossibility of securing a good contact between the bearing metal and the steel rods. By the electro-copper-





*Unit valve lifter assembly employed in G. M. C. trucks. Note the exposure to the crankcase oil spray allowing the parts to run in a bath of oil while the engine is in operation*



*Removing the detachable cylinder sleeve of the G. M. C. truck engine. Should a cylinder wall be scored through lack of lubrication or any other cause, so as to necessitate replacement, it is possible to make such in 4 hr.*

plating method, followed up by the tinning process, it has been found possible to get a very intimate metal contact which will not permit the babbitt to pound out.

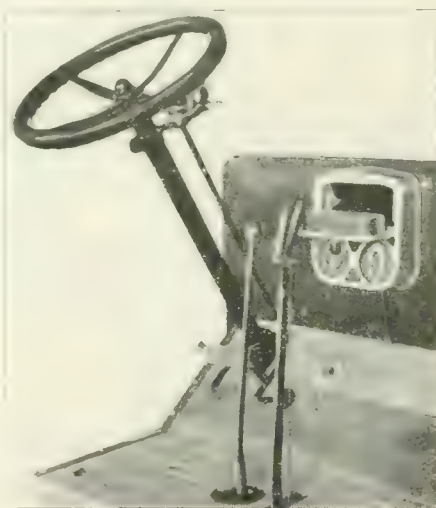
Because of the accessibility to the interior of the engine, the rods can be readily changed by dropping the pan, making the replacement of the connecting rods an easy operation. In fact, for long distance transportation, it would be feasible to carry a replacement rod along in the tool box.

An interesting feature is incorporated in the cooling system in that the water is circulated both by thermo-syphon and pump. The water in the cylinder head and around the valves is circulated by the pump. The water contained in the jackets around the cylinder sleeve is not affected by the pump, but circulates by thermo-syphon. Thus, the water around the jackets does not circulate until it is heated sufficiently to set up a thermo-syphon action.

The radiators are vertical fin and tube type, the tubes being assembled in connection with the cooling fins in a single unit or core. This construction is used on the two lighter models known as K-15 and K-16 of  $\frac{3}{4}$  and 1-ton capacity respectively. On the larger types, that is, the 2,  $3\frac{1}{2}$  and 5-ton sizes known as models K-41, K-71 and K-101, the radiators are of the vertical continuous fin and tube, built-up type, the assembly consisting of a core which is detachable as a unit, two side members, so designed as to protect the core and top and bottom members in the form of tanks, which insure even distribution of the water throughout the entire surface and content of the core.

To take care of present gasoline conditions, a combination manifold and carbureter have been worked out. Both the vertical section of the intake manifold and the venturi chamber of the car-

bureter are super-heated by exhaust gases direct from the exhaust manifold. Dampers are provided to take care of the regulation of the supply of heat and for very hot climates, a gasket can be inserted which cuts out the exhaust jacketing altogether, eliminating the hot-



*Instrument box incorporating in one unit the terminals and switches*

spot and permitting operation at atmospheric temperature. The carbureter is the Marvel.

The governor is a G. M. C. design and is of the flyball type. It consists of four steel balls, held in a steel pressing containing four separate grooves which act both as ball retainers and channels in which the balls travel.

Ignition is supplied by an Eisemann magneto which is mounted on the generator side of the engine and driven through a coupling by the armature shaft of the generator. On all but the smallest model, the Eisemann impulse

coupling is fitted. The electric generator is of G. M. C. design, manufactured by Remy. It has been designed exclusively for truck use, being rugged to withstand pounding and hard service.

One of the features of the electrical system is the fact that the wiring assembly is a complete unit in itself and is made up with an eye to simplicity. All the instruments, except those on the smallest model which have formerly been mounted directly on the dash, are now assembled in a single unit in the form of an aluminum housing. A panel on this housing can be lowered to provide access to the switch connections and terminals. No electric lights are furnished on K-15, which is the smallest model. The other four, however, are provided with electric headlights and tail light.

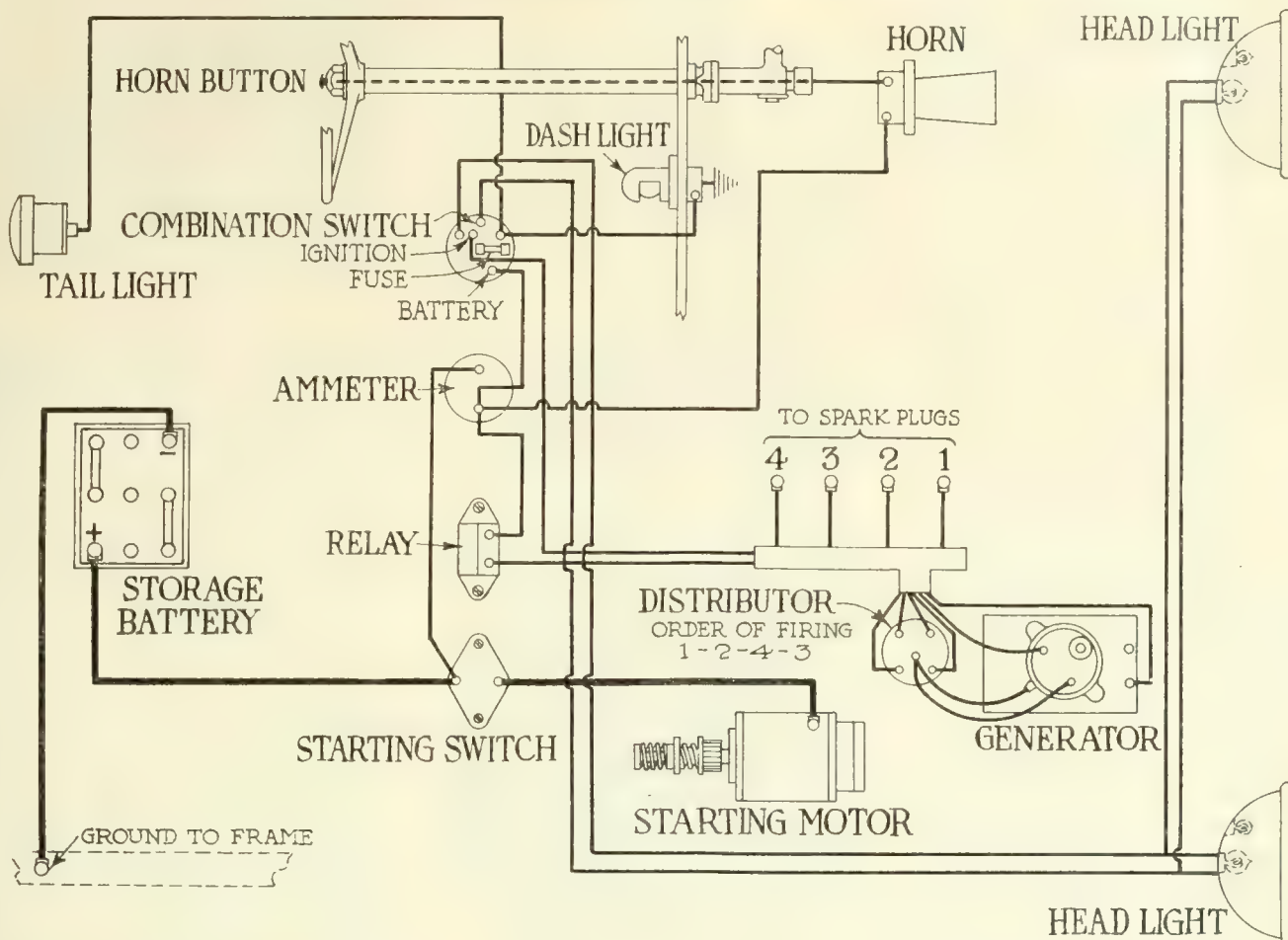
The transmission is of exceptional interest in that it provides two speed ranges, due to two sets of constant mesh gears, either one of which can be thrown into engagement, proving a separate speed range. Each speed range has four separate gear ratios. The addition of only four parts to the gearbox has provided this double range. This double range transmission has permitted of a higher geared rear axle, thus promoting economy and, at the same time, because of the double range of speed in the gearset, it is possible to secure a lower gear ratio than before. It has been estimated that as compared with the previous model, the pulling power of the truck has been increased 30 per cent and the economy by the same percentage. A third lever is fitted to take care of the shift into either of the speed ranges.

All of the G. M. C. transmissions, with the exception of the small model, are so designed as to enable the installation and use of both power take-off and power tire pump at the same time. The K-15, which is the smallest model, is provided with mounting for the tire pump only.



# Motor Truck Electric System Wiring Diagrams

## 17—Starting and Lighting Unit on Oldsmobile Truck



### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE:

	1920	
1—Ford, Starting and Lighting.....	Oct. 1	
2—Acme, Lighting.....	Oct. 15	
3—Bethlehem, Starting and Lighting.....	Oct. 15	
4—Atterbury, Lighting.....	Nov. 1	
5—Ace, Starting and Lighting.....	Nov. 1	
6—Atlas, Starting and Lighting.....	Nov. 15	
7—Briscoe, Starting and Lighting.....	Nov. 15	
8—Defiance, Starting and Lighting.....	Dec. 1	
9—Commerce, Starting and Lighting.....	Dec. 1	
10—Grant, Starting and Lighting.....	Dec. 15	
11—Brockway, Starting.....	Dec. 15	
	1921	
12—Maxwell, Lighting.....	Jan. 15	
13—International, Starting and Lighting.....	Feb. 1	
14—Mack, Starting and Lighting.....	Feb. 15	
15—Vim, Starting and Lighting.....	March 1	
16—Oldsmobile, Starting and Lighting.....	March 15	
17—Reo, Starting and Lighting.....	Next Issue	

Do not fail to heed the battery instructions contained in your Oldsmobile instruction book. By all means provide yourself with a hydrometer syringe. The battery will require more care than all of the other electrical appliances. If at all possible provide means for charging batteries from an outside source.

Use only distilled water for filling storage batteries. It always pays in the long run.

Always have a solution of common baking soda and water handy for cleaning the battery terminals; also vaseline for applying to battery connections after cleaning to prevent the acid from again corroding the connections.

The connections and electric wiring should be soldered. The unsoldered connection may work as good as a soldered connection at the time of being made but the resistance always increases.

Do not use acid when soldering electrical apparatus or wiring as the acid is an electrical conductor and destroys insulation. It is much better to use a non-corrosive soldering paste.

Do not use friction tape on high tension wiring or on other wiring where the grease or oil can get to it. It is much better to use linen tape and shellac them. Friction tape will not insulate ignition current and will not hold when oiling.

# Shop Equipment

*Time and Money Saved  
in Truck Repairs*

## Greb Rear Axle Press

THE Greb rear axle press is designed for removing axle and driveshaft gears and pressing on axle gears. It has a capacity for shafts up to 1 1/4 in. and gears up to 6 1/2 in. It will also remove connecting rods, wristpins, timing gears, and spindle body bushings.

By pushing the base plate to one side a solid base is procured for the axle to rest on. By pushing the plate in the opposite direction the hole centers with the hollow shaft, allowing the axle to pass through the base.

The press may be secured in an upright position, or can be used horizontally by means of a hinge. When in a horizontal position it can be used on work of unlimited length.

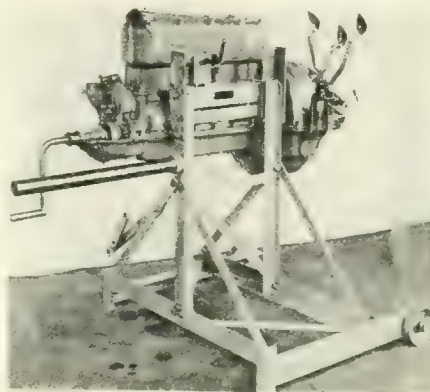
The press is constructed throughout of steel and malleable iron. There are two collar supports on the interior of the column to prevent an axle from buckling. A bar wrench and cup is furnished with the press which costs \$35, and is made by the Greb Co., Boston.

## K & S Engine Stand

THE K & S engine stand is both instantaneously portable or stationary. It is easily wheeled to any desired place. Only one screw is required to attach the engine to the stand, afterwards the mechanic may turn the engine to any desired position. The entire powerplant can be quickly applied to the stand without the use of wrenches.

**Greb Rear Axle Press  
K & S Engine Stand  
Hoosier Drilling Machine  
Schulz Radiator Repair  
Outfit  
Halburn Reamer  
Walker Roll-a-Car  
Canedy-Otto Buffer and  
Grinder**

The price is \$56. The Rosier-Howard Corp., Hutchinson, Kan., is distributor.



*K & S engine stand*

## Hoosier Drilling Machine

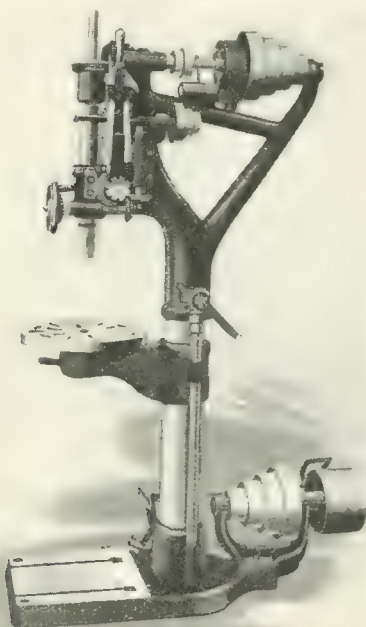
THERE are three power feeds in addition to the hand screw and lever feeds in the 20-in. vertical drilling machine made by the Hoosier Drilling Machine Co., Goshen, Ind. Eight speeds are obtainable, four of which are without the use of and four with the use of the double back gears.

The spindle which is equipped with a high-grade ball thrust bearing, is counterbalanced by weight in the column and has a quick return lever to facilitate rapid movement. The automatic stop attachment in connection with the graduated spindle sleeve assures the operator of accurate depth drilling and boring.

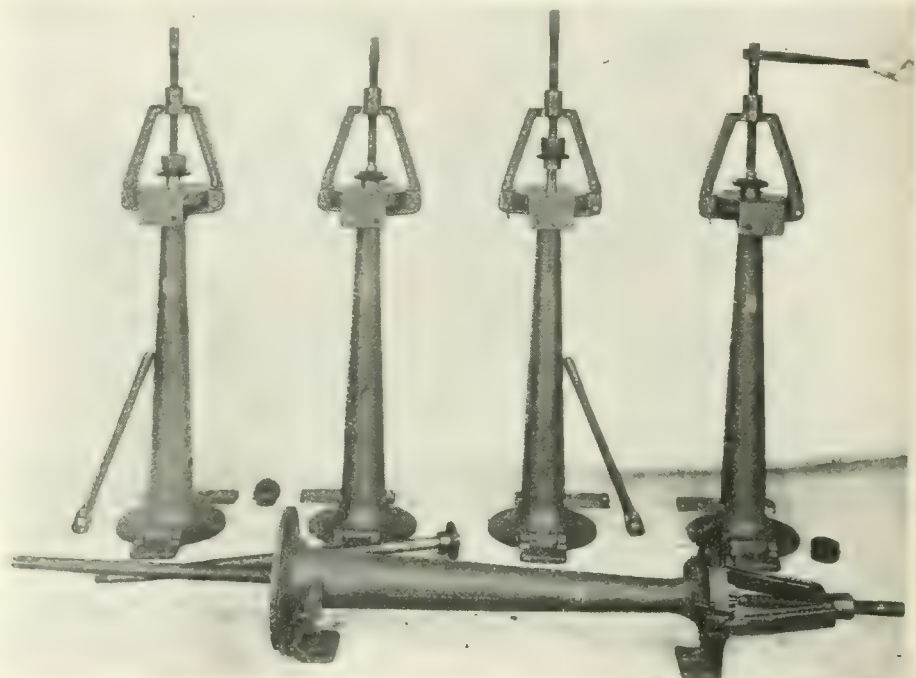
Specifications are as follows: Drills to center of 20 in.; distance from column to center of spindle, 10 1/4 in.; maximum distance spindle to table, 27 in.; maximum distance spindle to base, 41 1/4 in.; minimum distance spindle to base, 32 in.; travel of spindle, 9 1/4 in.; smallest diameter spindle, 1 1/4 in.; spindle diameter bearing in sleeve, 1 7/16 in.; hole in spindle, Morse taper, No. 3; speed of driving pulleys, 300 r.p.m.; feeds per revolution of spindle, .003, .005, .008 in.; cone drive belt required, 11 ft. 1 in. by 2 in.; feed drive belt required, 30 by 1 in.

## Schulz Radiator Repair Outfit

THE Schulz radiator repair machine makes the repairing of radiators an easy and simple matter. There is no

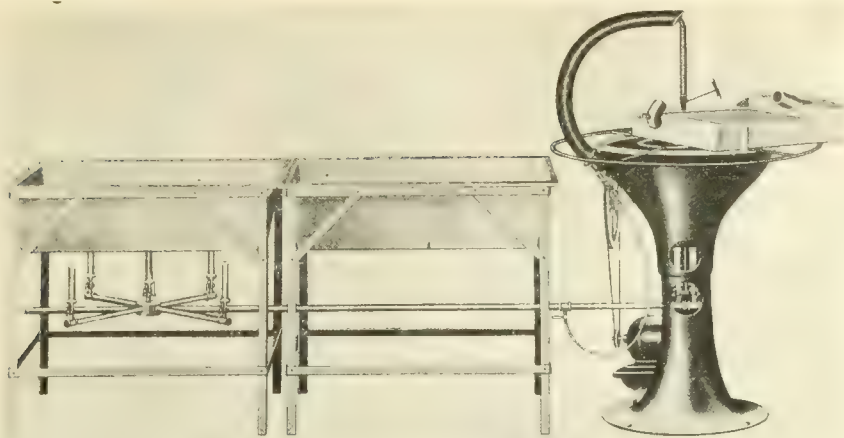


*Hoosier drilling machine*



*Greb rear axle press*



*Schulz radiator repair outfit*

spreading of the metal and no awkward handling of tools.

The apparatus for using the Schulz process consists of two tanks and a soldering machine. The first tank is used to boil an Oakite solution and is heated by Bunsen burners. The second tank is used for water to rinse the radiator and to test it in locating leaks. The soldering machine consists of a pedestal which holds the melting bowl and serves as a heat-retaining jacket for it, two Bunsen burners, mounted in the base, used to heat the melting bowl; a pump inside the bowl to force the solder through the distributor pipe; a 1/12 hp. motor to operate the pump; the solder distributing pipe with heat retaining jacket and priming burner which may easily be removed and used for a blow torch; a flexible nozzle with extended handle for guiding; and a supporting frame for holding the radiator.

The burners are designed for city gas. A gasoline burner equipment is furnished for use where city gas is not available.

To prepare the radiator it is first placed in the tank of boiling Oakite and boiled for 10 min. The action of the Oakite is to remove paint, grease and other foreign substances from the copper tubes and fins of the radiator, so as to give clean soldering surface.

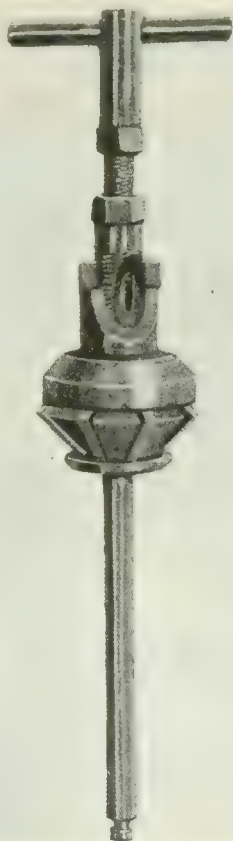
The maker is the Automotive Radiator Machine Co., Fort Dodge, Ia. The price of the machine equipped complete for gasoline is \$295, and that equipped for gas costs \$285.

### Halburn Reamer

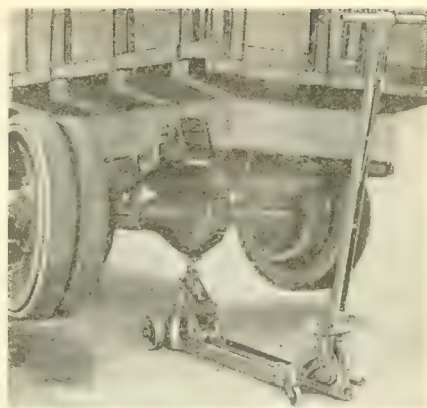
THE Halburn adjustable valve seat reamer has a wide range expansion. It is quickly adjusted to dimension by the turning of two nuts. The cutters are then locked into position by turning one of these nuts.

The construction is designed for strength. The cutters are hardened and ground tool steel that slide in a slot having a 45-deg. base. This brings the pressure against the solid body of the tool, making it impossible for the cutters to flip out, and giving the same effect as a solid tool.

Owing to the cutters seating in a 45-deg. slot, the pressure drives them toward the center, preventing the cutters



Above—  
Halburn  
reamer  
Left —  
Buffer and  
Grinder  
made by the  
Canedy-Otto  
Co.

*Walker Roll-A-Car*

from getting out of alignment. The center stem is solid throughout giving accuracy to the guiding of the cutters. The pilot stems are interchangeable by slipping them over the solid stem. A cross-bar wrench is supplied so that the pressure will be directly over the center of the tool. The tool can be lowered through a small porthole and expanded after it is inside the port.

Interchangeable cutters for 30 and 60 deg. can be supplied at slight cost. The cutters are quickly sharpened.

Two sets of 45-deg. cutters, 5/16, 3/8, and 7/16-in. pilot stems and wrench are included in the equipment at a cost of \$12. A set of eight extra cutters costs \$2. Extra pilot stems cost \$1. Cutters are resharpened at 25 cents per set. The maker is the Halborn Co., Los Angeles, Cal.

### Walker Roll-A-Car

THE Roll-A-Car is a new garage jack, designed to save time and labor. On account of its construction, every operation connected with jacking up a truck can be performed while the operator is standing up. All that is necessary is to roll the jack under the truck placing the lifting cap directly under the axle—place foot on pedal, which automatically raises the rack bar to the proper lifting height—release the lever—give the handle one stroke—the truck rises 1 in. Another stroke raises the truck 1 more inch. The jack will raise a vehicle 6 in. in all. To lower, the handle is reversed and pump rack down in the same manner. The jack weighs 117 lb. and has a lifting capacity of 5000 lb. The price is \$70. The manufacturer is the Walker Mfg. Co., Racine, Wis.

### Combination Buffer and Grinder

A COMBINATION grinding and polishing machine for repair shops will be found practical. A good example of one of these is the Canedy-Otto combination buffer and grinder with tight and loose pulleys. The height from the floor to the center of the spindle is 38 in., the entire length of the spindle being 37 in. The distance between the wheels is 28½ in. The speed of the spindle is 1,250 r.p.m. The maker is the Canedy-Otto Mfg. Co., Chicago.



# New Accessories and Parts

**Mansfield Products—Duo Point Chain Tool—Shursparc Ignition Unit—Greer Gun—Edstrom Wrench—Staynew Air Filter—Lidseon Force Feed Oilers—Ranger Lumber Trailer**

## Mansfield Products

**T**HE Mansfield Steel Corp., Detroit, which has for some time been manufacturing radiator guards for motor trucks, also produces a combination front bumper and tow hooks as well as a trailer attachment. The radiator guards have been tested by the Underwriters' Laboratories and listed as standard by them. The guards are made with 2 by 2 by  $\frac{1}{4}$ -in. angle frame,  $\frac{3}{8}$  by  $1\frac{1}{2}$ -in. flat filler bars with  $1\frac{1}{2}$  by  $1\frac{1}{2}$  by  $\frac{1}{4}$ -in. angle iron braces. When it is necessary to install radiator guards on trucks with a horn or curved frame, an extension is furnished for lengthening the starting crank at an extra cost of \$6.

The one-piece hand forged trailer or towing attachments do not pull from the truck frame cross member, but do their pulling from the truck side rails. The bumpers for trucks up to  $2\frac{1}{2}$ -ton capacity are made of 4-in.  $5\frac{1}{4}$ -lb. channel. Bumpers for heavier trucks are made of 5-in. channel. This type of bumper can be applied to almost any truck with a goose neck frame. The cast steel brackets are formed to fit the horn of the goose neck of the frame and are held in place with U bolts.

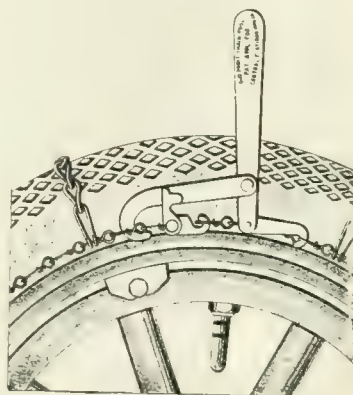
The trailer attachments, types E and G, have springs for taking care of shocks when starting and stopping. Type E is adjustable and can be used on all trucks where the frames are not less than 34 in. wide or over 39 in. wide. Type G is used for dump trucks where it is impossible to use the turnbuckle or trussrod for the reason that same might strike the housing on the rear axle. The only tools

needed to install either type are a breast drill and wrench.

The prices of the radiator guards are as follows:  $\frac{3}{4}$  to  $2\frac{1}{2}$  tons, \$22.50; 3 to 4 tons, \$23.50; and 5 to 6 tons, \$25. The prices of the combination front bumper and tow hooks range from \$24 for  $\frac{3}{4}$  to  $2\frac{1}{2}$ -ton trucks to \$25 for 3 to 5-ton trucks. The trailer attachment, type E, price is \$50 for all sizes.

## Duo Point Chain Tool

**T**HE Duo Point chain tool is designed for connecting the end links on tire chains. It is hooked into the upper and lower links of the tire chain, and the leverage makes it easy to connect the ends. The tool weighs 8 oz. and is made of  $\frac{3}{32}$ -in., No. 2 cold-rolled steel. The price is 60 cents. The maker is the Central Flatiron Mfg. Co., Johnson City, N. Y.

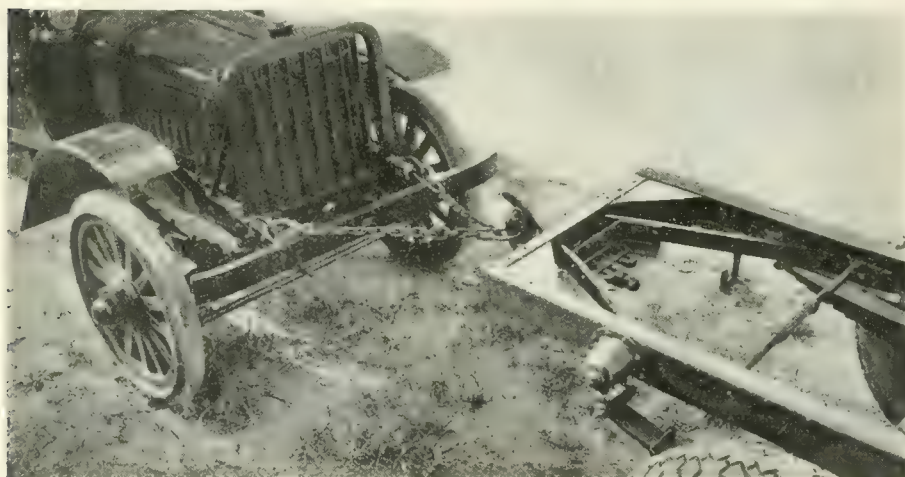


Duo Point chain tool

## Shursparc Ignition Unit

**T**HE idea of eliminating spark plug trouble by intensifying the spark across the gap in series is not new. Just before the armistice was signed the Bureau of Standards ran an exhaustive test upon the principle of intensifying the spark across the gap for the purpose of finding the true worth of the performance of a series gap and what effect it would have upon spark plugs. The purpose of this test was to find a device that would overcome the spark plug trouble existing at the time with airplane engines. It is because of the meritorious value the spark gap has in aiding in ignition, that Shursparc was brought out by the Sure Spark Ignition Corp., Washington, D. C., and sold exclusively by Quincy & Schroeder, New York City.

The Shursparc auxiliary ignition unit, it is stated, assists either the battery or magneto systems in the delivery of a uniform and positive spark by keeping all of the plugs sparking. The unit is compact and enclosed in an unbreakable insulating material and is under the control of the driver at all times, whether warming up the engine, city running, long distance hauling, or cleaning fouled or carbonized plugs. A dash plate dial enables the driver to control the intensity of the spark for all operating conditions. For example, in ordinary city running—10 to 15 m.p.h.—the arrow on the dial should register at "city running." For road driving where the speed of the truck is 20 m.p.h. and more, the



View showing the Mansfield radiator guard, combination front bumper and two hooks and trailer attachment



Mounting of the Shursparc ignition unit



arrow should point to "touring." The arrow should register at "clean plug" if the unit is installed on a truck which has fouled or broke plugs at time of installation.

The price of Model A for four-cylinder engines is \$12.50.

Grees Gun

THE barrel of the Grees Gun is drawn from steel and is finished in nickel. The cap is at the lower end so that the gun can be filled by the piston action like an oil gun. The lower part is arranged to swing in almost a full circle, which makes it convenient for use in inaccessible places. The nipples are furnished in several styles and threads, and adapters are provided for spring bolts with integral grease cups. All nipples have ball check valves. The nozzle of the gun is attached to the nipple by a quarter turn. The maker is the Ireland & Mathews Mfg. Co., Detroit.

Edstrom Wrench

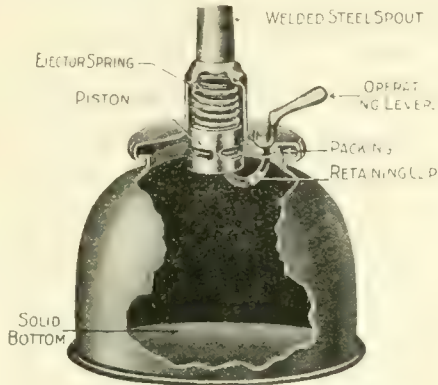
A POSITIVE gripping action is secured in the Edstrom wrench by the small teeth on the movable jaw which engage with similar teeth on a sliding lug within the handle. This lug is controlled by the thumb lock, a movement of which forces the lug against the teeth of the sliding jaw. The head of the wrench is not very large so that it fits into almost any place that the ordinary open end type will go. The jaws automatically close on the nut, and the wrench is operated with one hand. The maker is the Edstrom Machinery Co., Cary, Ill.

Staynew Air Filter

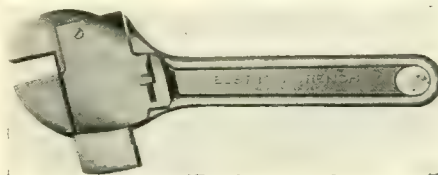
AN air cleaner in which felt is used as a filtering medium has recently been placed on the market by the Staynew Filter Co., Rochester, N. Y. As will be seen in the accompanying illustration the device consists of a cylindrical, perforated shell, into which is fitted an elongated spider formed of wire screen and covered with felt. The central portion of the spider communicates with a

central tube, through which the clean air entering the carburetor flows. The felt-covered surface spider is said to have an area of over 500 sq. in. The area of the inlet holes being large, the entering velocity of the air is low and consequently the larger particles of dust are allowed to settle out before the air passes through the felt. It is claimed that the air entering the cleaner does not strike directly upon the filtering material and that the dust which collects on the surface of the felt is shaken off by the vibration of the vehicle on which the cleaner is used. The dust shaken loose drops out of the shell through holes in the base.

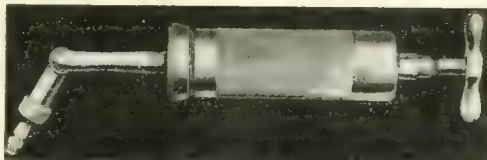
The filter is made in three sizes, the large one being priced at \$16.50; the intermediate at \$15; and the Ford size at \$12.50.



Lidseen force feed oiler



Edstrom wrench



Grees Gun

Lidseen Force Feed Oilers

THE Lidseen positive force feed oiler will be found of practical use on a truck or in a garage, as it gives just the amount of oil required and therefore is a saver of lubricant.

This oiler is operated with a lever control located at the connection of the spout and can, which makes it handy to use. This lever positively controls the oil, allowing the operator to eject any amount from a drop to a big squirt.

Having a welded spout and no solder on the entire can, the operator is not troubled with having to mend spouts or can, the force feed action doing away with clogged spouts and the time required in cleaning them. The large opening saves time in filling the can and the saving of oil requires less filling.

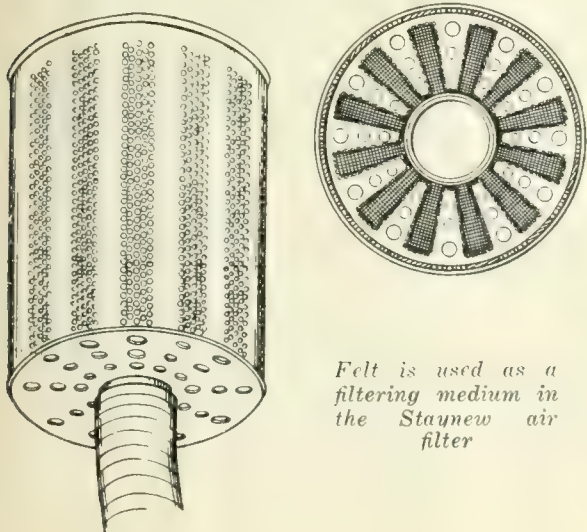
This oiler will eject oil in vertical or inverted position. If the operator should have occasion to oil overhead, he will invert the oiler and pull the operating lever half way down and hold, then turn the oiler in vertical position and pull lever the balance of the way down, thus ejecting oil overhead. The maker is Gustave Lidseen, Chicago.

Ranger Lumber Trailer

UNLOADING of lumber is a one-man job with the Ranger Lumber Trailer. This trailer is equipped with an extension frame that will permit the hauling of practically any length of lumber. When fully extended it has a length of 18 ft., which enables loads with a length of 24 ft. to be stacked and when coupled close has a loading base of 144 in.

Quick coupling and uncoupling is a feature of the Ranger trailer. The fifth wheel used permits the trailer to be attached and detached quickly. An arrangement of springs absorbs the shocks of sudden stops and jerky starts, as well as bad road conditions. One of the advantages of the rocking fifth wheel is the principle which provides for a fore and aft rocking motion, yet prevents tipping from side to side.

The maker of the Ranger lumber trailer is the Southern Motor Mfg. Association, Ltd., Houston, Tex. This company makes a 2-ton worm-driven truck, equipped with a Wisconsin engine. The price of this truck is \$2,575.



Felt is used as a filtering medium in the Staynew air filter



The Ranger lumber trailer is fitted with an extension frame







Clutch Keeps Spinning After Pedal Is Fully Depressed

To the Editor, COMMERCIAL VEHICLE:

What causes a Brown-Lipe clutch to keep spinning after the pedal is fully depressed?—H. H., New York City.

Your clutch needs a brake washer. The brake washer is worn so that it will not brake the clutch or keep it from spinning after the pedal is fully depressed. If you will write to the Brown-Lipe Gear Co., Syracuse, N. Y., it will send you a new washer.

The following information pertains to the assembly, care and repair of the clutch assembly:

Before the clutch is assembled to the flywheel of the engine great care should be used to see that all foreign matter, such as burrs and dirt, is removed from the machined surface of the flywheel. This will allow the flange of the outer clutch drum to be taken up flush with the surface of the flywheel. If this precaution is not taken the clutch will not run eccentric and the tendency would be for the clutch to stick as it would not let the driving disk go fully into place when the clutch has been disengaged and then engaged.

The following details in connection with lubrication and adjustment will be of interest to you:

The disks should be kept free from oil at all times. The small bearing which pilots the end of the front drive shaft into the flywheel of the engine should be packed with grease when the transmission is assembled into the engine. In this event it will not require further attention unless the clutch and transmission are removed from the engine, then, of course, in replacing it, it should be packed with grease. The throwout bearing is packed with heavy grease at the time that it is assembled to the clutch. This lubrication should be sufficient for many thousand miles of service as the bearing operates only when the clutch is disengaged or when pressure is put on the clutch pedal. For this reason do not use the clutch pedal as a foot rest.

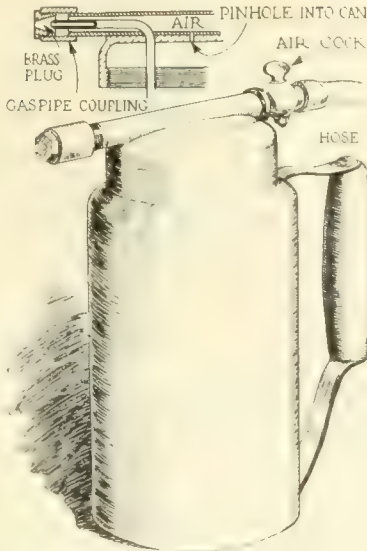
In the event that these clutches have a tendency to slip, tighten the driven drum bolts by turning each of the three bolt heads 1/2 turn clockwise. Then try clutch and tighten more if necessary. Always give each of the three bolts the same number of turns. If this adjustment does not eliminate your trouble, the clutch should then be disassembled, as perhaps your linings or disks are worn excessively.

Cleaning Grease from Running Gear of Truck

To the Editor, COMMERCIAL VEHICLE:

I would like to know of the best method of cleaning grease from the running gear preparatory to painting.—S. DRAKE, Norristown, Pa.

Stronger cleaning solutions can be used in cleaning before repainting than can be used for cleaning before repainting. If you intend repainting the chassis and have a wash rack, scrape off



Home-made spraying device made of standard fittings. The coupling which forms the nozzle adjustment has a plug fitted in one end and is drilled out as shown. A very small pinhole through the cover into the can will help in raising the liquid to the nozzle although it is not needed in some cases

the worst of the caked mud and grease with a putty knife and then wash it with gasoline, using a gasoline brush or a



The Forum Solves Problems!

THE COMMERCIAL VEHICLE Forum Dept. will answer any question on trucks and trucking such as those on this page.

If you have any problem, write to the Forum about it!

Let Us Help Solve Yours!



worn out paint brush for the purpose.

Next make up a suds of soap and water and sponge off all of the grease that has been loosened up by the gasoline, and then hose off thoroughly. Out of the way places, like the insides of the splashers, rear side of gas tank, etc., are not ordinarily painted even in the best grades of work, and hence no cleaning of them is required. If you have no wash rack available you must do the best you can by scraping and washing with gasoline—the soap suds can be used also—and then sand the surfaces well with No. 1/2 sandpaper to free them of any remaining grease or dirt.

If you have a supply of compressed air you can rig up a spray at little cost that will do this cleaning quickly and cheaply. Such a device, shown in one of the accompanying illustrations, can be improvised from a few pieces of copper or brass tubing, and can be used for spraying the soap suds as well as the gasoline.

H. H. Found Engine Improvement from W. H. B.'s Solution

To the Editor, COMMERCIAL VEHICLE:

I would like to state further developments concerning my truck engine, which, you will remember, had no power and knocked, instead of pulled on all four.

As soon as I read W. H. B.'s solution, which confirmed my own opinion, I raised the cylinder blocks 1/8 of an in. I would have raised them more, but was dissuaded from doing so by two agents from the truck factory, who visited me while at work. They strenuously objected to my raising the cylinders.

Upon using the truck I was gratified to find a great improvement in power, but it was still not perfect. I also reset the magneto correctly. After a few days the engine started to lose power and knock and click. This, I suppose, came from carbon collecting and decreasing the compression space, and shows that the cylinders should have been raised 1/4 in., as W. H. B. instructed.—H. H., New York City.

Forms of Resistance to Control Speed of Truck

To the Editor, COMMERCIAL VEHICLE:

Please explain just what precautions a driver should take in driving up and down grades and in stopping.—G. CREEDE, Bayonne, N. J.

In driving down grade there are three forms of resistance that can be used to control the speed of the truck. Its momentum can be arrested by means of the brakes, the gears may be shifted into a lower speed, or the engine may be used as a brake by shutting off the ignition. The lower the gear used the greater the resistance, so that the greatest possible resistance in the transmission is had with the gears in the first speed. Added resistance may be had by shutting off the ignition, and, of course, still more by using the brakes. All three forms (the gear in first, the ignition off and brakes applied) hardly need be used. The object is to refrain from using the brakes because keeping them applied wears the linings.

In ascending a grade use judgment about the ability of the truck. If it is very steep, shift to a lower gear before reaching the grade. If you think it can be done in high without the engine knocking, do not shift. Make as quick a shift as possible, if it is necessary to do shifting on an upgrade. If you happen to stall the engine on the grade, shift immediately into neutral and apply the hand brake, at the same time cramping the wheels.

In slowing the truck down always slow down the engine first, and anticipate your stop so as to avoid excessive use of the brakes. After the truck has been brought to a standstill, the gears shifted into neutral and the hand brake applied, turn the ignition switch to "off" position, retard the spark lever to one-quarter position and the throttle lever to one-quarter open, placing these controls ready for the next start.



## Straightening Warped Pieces of Case Hardened Steel

To the Editor, COMMERCIAL VEHICLE:

I have heard that one should not straighten a warped piece of case hardened steel by pressure. What method do you think is best?—D. BROWN, Paterson, N. J.

Uneven heat and uneven cooling warps the steel. Case hardened pieces cannot be straightened by pressure or by pounding as this cracks the case. To straighten, first find the high or "bowed" part. Mark this with a chalk line; second, heat the piece slightly—never near a red heat (the amount of heat depends upon the warp, and can only be determined by trial); third, clamp the piece in a vise between the block, as shown in the accompanying illustration; and fourth, direct a stream of water at the chalk line. This will contract the long side and make the piece straight.



Method for straightening a warped piece of case hardened steel

## Standard Parts Used on 2-Ton Motor Trucks

To the Editor, COMMERCIAL VEHICLE:

Will you kindly give me some information based on the percentage of models, used by the manufacturers in frames, axles, springs, radiators, steering gears, universal joints, transmissions and wheels on 2-ton trucks? If you have not such figures will you kindly give me information as to where I can get them?—F. S., Detroit.

The names of makers of frames, axles, springs, radiators, steering gears, universal joints and gearsets as used on the 2-ton trucks offered on the 1921 market were included in the complete detail technical specifications of gasoline motor trucks as published on pages 356 to 371 of THE COMMERCIAL VEHICLE for Jan. 1, 1921.

In addition, the average construction used on all 2-ton trucks offered on the market for this year was shown in the illustration at the top of page 347 in the same issue. Furthermore, you will find a separate list of the 2-ton trucks offered on the 1921 market on page 353.

## Denby Clutch Adjustment—Reader Wants Information

To the Editor, COMMERCIAL VEHICLE:

I operate a 3-ton Denby truck, whose clutch engages very harsh, that is, if great care is not taken when the clutch is allowed to engage, the truck will jump. What would be a good way to remedy this defect?—F. V., Merchants Express & Transfer Co., St. Louis, Mo.

The clutch may be slipping, and in that case it would be necessary for you to tighten the springs.

Care must be taken to see that the clutch disk drum does not hit the disk backing plate casting when disengaged. If this should occur a new driving disk should be inserted at the rear end of the clutch.

The clutch pedal in the engaged posi-

tion, if properly adjusted, should have 1 in. free motion or play when the pedal is lifted by hand. If, in this position, it touches the board the full action of the clutch spring is not obtained. In adjusting, loosen the nut at the hub of the

## Knowledge Is Power

Are you handicapped for facts?

Is there some problem that is annoying you and holding you up in your business?

Let us solve it for you!

This forum is for you. It is a regular feature in each issue.

## Let Us Serve You

clutch pedal arm and adjust by turning the worm.

About once a month pour in 1 pint of mixture, 2/3 cylinder oil and 1/3 kerosene.

## Back-Fires Through Carbureter—Reasons for

To the Editor, COMMERCIAL VEHICLE:

I would like to know what causes a back-fire through the carbureter.—L. BOND, Pittsburgh, Pa.

You may trace your trouble to the following:

- 1—Gas mixture too lean.
- 2—Gasoline tank empty.
- 3—Inlet valves not seating properly.
- 4—Water in carbureter.
- 5—Inlet valve springs broken or weak.
- Valves loose or cracked.

6—Incorrect plug wiring. When this happens, the inlet valve in one of your cylinders is opening at the same time that a spark is occurring, or at the time that the piston is going down on its suction stroke. The burning gases will naturally follow back past the open valve through to the carbureter, thus causing the "spit" or back-fire.

## Abnormal Ball Bearing Wear and Its Causes

To the Editor, COMMERCIAL VEHICLE:

I have had considerable trouble with one of my ball bearings which wears out too quickly. I have had the original bearing reground and it wore out as quickly as before. The installation of new bearings of a well-known make did not solve the problem. What would you suggest in the way of tracing the causes of this abnormal wear?—K. BROWN, Jersey City, N. J.

The first thing to do in a case such as this is to discover if similar bearings in other trucks of the same make as yours behave in a similar manner to yours. If so, the maker will undoubtedly remedy the difficulty, whether the guaranty covers it or not, as it is evidently an error in design. If, on the other hand, you find yourself alone in the difficulty, you may be sure that the fault is in manner in which bearing is supported, housed or cared for.

If the truck is being overloaded, your experience is no more than is to be expected. Check over the following list of possibilities, and do not dismiss any of them from your mind until you have assured yourself by suitable inspection or tests that they do not apply.

1. See that the bearing is receiving sufficient lubricant each day to insure the presence of oil or grease on it at all times. See that a proper lubricant is employed. Use nothing but high-grade mineral oil or grease. Other lubricants usually contain acids that are destructive to the essentially smooth surface of the balls and races.

2. See that the bearing is properly inclosed and dust- and water-tight. A little water or grit will ruin the most perfect and carefully applied and lubricated ball bearing on earth.

3. See that the shaft and the bearing, as well as the bearing and its seat are all in proper alignment. See that the bearing lines up properly with others on the same shaft.

4. See that the bearing does not have to take excessive end-thrusts. An annular ball bearing, if avoidance is possible, should receive no end-thrust at all. If any, it should not exceed 16 per cent of its rated radial load capacity.

5. See that the bearing fits the shaft and its seat snugly. In applying a bearing always drive it through a wooden block or cushion of some sort, distributing the pressure all around its circumference.

## Tractive Effort of Pneumatics on Asphalt Roads

To the Editor, COMMERCIAL VEHICLE:

What is the tractive effort of pneumatic and solid tires on hard level asphalt roads as well as on other road surfaces?—W. R., Mt. Vernon, N. Y.

According to the S. A. E. handbook the tractive effort of pneumatic tires on hard level asphalt varies from 15 lb. per ton for special tires up to 35 lb. per ton for standard types of pneumatic tires as used on larger sizes of pas-



senger cars. The tractive effort of solid tires on hard level asphalt varies from 18 lb. to 26 lb. per ton, depending upon the diameter of the driving wheels, revolutions per minute, the load in pounds per square inch, or pounds per inch of tire width; the composition of the compound used and the method of attaching the tire to the wheel rim. The tractive effort of a vehicle will vary with the road surface according to the following table, taking the tractive effort of a vehicle on hard level asphalt as unity:

Level asphalt, hard.....	1.00
Wood pavement .....	1.15
Level macadam .....	1.15 to 3.00
Plank road .....	0.09
Cobble stones .....	1.75
Good dirt road .....	1.10 to 2.00
Ordinary country road dirt.....	2.00
Sand .....	20.00

### Truck Life Figured in Miles— Not Years

To the Editor, COMMERCIAL VEHICLE:

Please give me any data which you may have on the average life in years and also in mileage of motor trucks in the class of Packard, Pierce-Arrow and White.—H. WHITMAN, Pittsburgh, Pa.

We should say that it is becoming customary to gage the life of a truck by the number of miles it will run rather than the number of years. This is due to the fact that as a general thing a truck wears out in proportion to the number of miles it is run. Some trucks which cover a small mileage yearly will undoubtedly last longer than those which cover a greater mileage, so that the mileage basis gives a more scientific method of estimating truck life and truck cost.

The total mileage which any of the trucks which you mention might be expected to cover before being worn out is a very difficult question to answer because of the great variety of work in which trucks are engaged. As a general rule, however, the mileage life is assumed to be somewhere between 100,000 and 150,000 miles.

### Irreversible Steering Gear and Its Correct Meaning

To the Editor, COMMERCIAL VEHICLE:

What is the correct meaning of irreversible steering gear?—K. M., Passaic, N. J.

Irreversible gears, or gears which cannot be reversed, are those which will transmit power in but one direction, sometimes known as self-locking gears. Gears of this sort take motion from one end and transmit it at another. When the motion is taken from one direction the gears transmit it, but when the action is reversed they will not.

As applied to a steering gear, such a form of gearing permits the turning of the vehicle wheels by twisting the steering wheel, but does not permit the steering wheel to be turned by any effort of the wheels. This form of gear is used on some vehicles in order to prevent ruts or stones in the road from wrenching the wheel from the driver's hands.

With a reversible steering gear under certain conditions it is necessary for the operator to brace himself against this tendency, especially when negotiating sand, but with the irreversible gear no road condition can cause wheel to turn.

In construction the irreversible steering gear is usually of the worm-and-wheel, worm-and-sector or screw-and-nut type, the screw or worm in each case being relied upon to impart the irreversibility. Such a worm or screw is cut at so slow a pitch that while it meshes when turned, the latter cannot turn the former when it is turned.

### Changed Size of Tire—Forgot to Allow for Mileage Recorder

To the Editor, COMMERCIAL VEHICLE:

I recently changed my 34 by 4-in. tires and replaced them with 35 by 4½-in. Having forgotten to change the sprocket wheel of the speedometer, I would like to know what the mileage record will show short per 1000 miles with this arrangement. A. EVERETT, Philadelphia.

A 34-in. tire revolves 593.2 times per mile; a 35-in. tire revolves 576.2 times

### Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

Make use of it.

The editors will be glad to answer any questions which you ask.

### Answers

per mile. Thus, to determine the reading on the speedometer we have an equation as follows:

$$\begin{array}{r} X \quad 593.2 \\ 1000 \quad 576.2 \end{array}$$

Solving the equation we have X equal to 1031.2, which is the number of miles your truck has traveled when the present speedometer attachment registers 1000 miles. In other words, there is a difference of 31.2 miles per 1000 miles in the reading.

## Railway Demountable Bodies

(Continued from page 104)

the space between the two sets of rails being bridged simply by dropping them into position.

A simple form of winch and wire rope with hook is arranged on both trailer and truck so that the body can be drawn across from one to the other, as required and, notwithstanding that the vehicles may be resting on a gradient at the moment, or may be of different heights. The provision of the winch is an inexpensive matter, and precludes any difficulty arising from its being unable to move the load at any time, while also making the use of ball or roller bearings unnecessary.

A feature of the D.C.C. system is that

## Replacing Foot Brake Shoes on Packard Truck

To the Editor, COMMERCIAL VEHICLE:

What is the best method to proceed with in replacing the foot brake shoes on a Packard truck?—G. Q., Brooklyn, N. Y.

To remove the foot brake shoes proceed as follows:

1. Remove the cotter pins from the front of the brake shoe block pins.
2. Back out the two screws which adjust each brake shoe.
3. Remove the brake shoe pins.
4. Disconnect the two brake block lever ends and swing upward away from brake drum.
5. Slip the shoes down and around drum and out from under shoe blocks.
6. Reverse the operation when putting on the new shoes.
7. When final adjustment is made be sure that the brake shoes are concentric with the drum so that the lining will bear evenly. This is accomplished by applying the brake and then screwing the brake block set screws into contact with the blocks, after which check nuts should be tightened.

## Bill to Increase Tax on Indiana Trailers and Trucks

INDIANAPOLIS, IND., Feb. 19—A bill just introduced in the lower house of the state legislature provides for registration fees for trucks ranging from \$6 to \$50. Funds derived from the fees would be used exclusively for repair and construction of roads. No trucks greater than 10 tons would be permitted to use public highways.

Truck fees provided are:

One-fourth ton, \$6; for each trailer, \$3; ¾-ton, \$8; each trailer, \$4; 1-ton, \$10; each trailer, \$5; 2-ton, \$20; each trailer, \$10; 3½-ton, \$30; each trailer, \$15; 5-ton, \$40; each trailer, \$20; 7½-ton or more, \$50; each trailer, \$25.

Operators of commercial trucks are opposed to graduated scale on trailer fees. They argue that a trailer hauled by a large truck contributes no more to the wear on highways than a trailer hitched to a lighter truck.

the body can be put on or taken off the tender or trailer at whichever end may be handiest at the moment. A special type of locking bolt is fitted on the motor truck which effectually prevents any involuntary movement of the body.

It may be found advisable to roll the bodies off on to loading decks, in which case it is a good plan to fashion the deck edge into a saw formation, which gives more access to the bodies for loading without making an expensive job of the decking.

The D.C.C. system of Demountable Bodies is being put on the market by Electromobile, Limited, of Otley, England.





## Taxed Out of Existence?

A BILL has just been introduced at Albany which threatens a 100 per cent increase in fees on trucks of over 3-tons capacity in New York State.

Are the truck owners going to stand for it?

Fleet owners form a wealthy and influential class. Their numbers and their influence are increasing almost daily. And they are unorganized as a class.

What a rich and promising field do they present to the eye of the inquiring legislator, seeking for fresh funds in pastures new.

Fleet owners control one of the four great transportation systems of industry—a system that is growing faster than the others, and that is still unorganized.

"It's too sturdy a system to break under the strain," says Mr. Legislator, "and it's too unorganized to defend itself! Now is our chance!"

But wait a minute. There's got to be some sort of a peg to hang this increase on.

"That's easy," says Mr. Legislator. "Motor trucks—at least heavy motor trucks—are destroying our roads. We must have more money to keep the roads in shape. There's your peg! What is more logical than making the trucks pay for the damage they do?"

"That will cut down the return from the small trucks, but we'll get a rich haul from the big ones."

Here is the gist of the bill:

Capacity of Truck	Amount of Increase	Percentage of Increase
2 tons or less.....	\$15	50
2-3 tons .....	22.50	50
3-4 tons .....	40	100
4-5 tons .....	50	100
5-6 tons .....	60	100
6-7 tons .....	70	100
7-8 tons .....	80	100
8-9 tons .....	90	100
9-10 tons .....	100	100
10-11 tons .....	110	100
11-12 tons .....	120	100
12-13 tons .....	130	100
13-14 tons .....	140	100

Trailer fees increased 50 per cent.

No truck of combined weight and load exceeding 25,000 lb. permitted to operate on highways outside of cities.

Now in the first place it is neither logical nor fair to charge the trucks more because of road damage, because on the present basis of taxation the returns from vehicular taxes more than pay for the cost of road maintenance throughout the State. And inci-

dentally larger trucks travel more slowly and do little damage to good roads. The damage they do is to roads in need of repair already—and in this case the damage is reciprocal; the truck suffers also.

But most important of all is the fact that trucking interests can *not* stand the strain of ever-increasing taxation. Unless this increased taxation is stopped, it is going to be the old story of the goose that laid the golden egg. What is more, transportation to-day is insufficient for the growing needs of the nation-wide industry. The railroads are in a bad way for lack of rolling stock. And if trucks are taxed out of existence the destruction of the trucking industry will bring hardship and curtailment to many another industry now dependent on trucks.

Nor is New York the only State whose legislators are trying to overreach themselves. The officials in many other States are so far behind the times that the motor truck is to them an unknown factor in the business and home life of the people of the State which they govern. What the truck has done for industry is Greek to them. They keep their eyes glued to a patch of worn out or badly constructed highway and entirely ignore the part the motor truck is playing in the continuous development of industry and commerce—and of good roads and agricultural expansion as well.

Unreasonably increased fees on trucks means higher operating costs and higher trucking charges. Higher charges means smaller profits to truck users. And small profits or no profits at all means curtailment of industry.

For the motor truck has become an integral part of industry and by the motor truck much of modern industry in the United States must stand or fall.

Legislators do not appear to realize this. But they must be made to realize it.

Organize! If there is a truck association in your city, join it and work for the better education of the legislator. If there is no truck association, form one and organize a mutual protection society against unfair taxation. There has been enough talk on this subject. The time has come for action.

And if you live in the State of New York, write a strong letter of protest *to-day* to Governor Nathan L. Miller, protesting against the passage of the above bill or any other iniquitous bill tending to tax out of existence a vital and fundamental feature of the nation's industrial life.



## Store Door Delivery from Freight Cars

### Railway Executives Discuss Wider Use of Trucks to Speed Up Deliveries

WASHINGTON, D. C., March 9—Railway traffic executives in eastern territory now have before their committee a proposition from the transportation committee of the Federal Highway Council to make a larger use of the motor truck in the store-door collection and delivery of freight.

Numerous meetings of the Council's committee have been held to determine the proper policy in approaching this important subject. The proposition now before railway executives is the concrete result of these meetings.

In determining the class of traffic which would economically come under the new plan of delivery, J. C. Lincoln, traffic manager of the Merchants' Association, of New York, has had embodied in the plan of procedure the principle that store-door delivery should apply to all station or platform delivery. This would exclude carload lots delivered to sidings, but would include carload lots handled over freight platforms at terminals. In most smaller cities carload lots are seldom handled over platforms, while at New York City a large portion of the freight is so handled, whether it is carload or less than carload lot.

A motion has also been adopted to the effect that "the committee deems it most advantageous to have store-door delivery a carrier service, but at additional rates not included in the through rates." It was brought out in the discussion that store-door delivery tariffs should be published separately, similar to the lighterage tariffs of New York.

Discussion at the last conference thoroughly established the fact that this proposed service should not be an additional burden upon the railroads.

Upon the suggestion of Mr. William J. Pitt, of Philadelphia, the committee has adopted a recommendation that "the carriers, to avoid congestion and delay, be urged to establish and operate, in all large cities, a store-door collection and delivery system to be performed by or under the control of the carrier, the carrier to assume liability for the safe transfer by their representatives, and a reasonable charge to be assessed for such service."

The committee entrusted with the task of presenting the plan to the railroads is composed of A. E. Beck, general traffic manager, Merchants' and Manufacturers' Association, Baltimore, Md.; J. C. Lincoln, general traffic manager, Merchants' Association, New York; Wm. J. Pitt, general traffic manager, John Lucas & Co., Philadelphia, and who is also chairman of the traffic committees, Paint Manufacturers' Association of the United States; National Varnish Manufacturers' Association, and Philadelphia Paint, Oil and Varnish Club; and T. T. Harkrader, general traffic manager,

American Tobacco Co., New York; W. J. L. Banham, general traffic manager of the Otis Elevator Co., New York, and Dr. R. S. MacElwee, director, Bureau of Foreign and Domestic Commerce, Washington, D. C.

### Nine States May License Truck Mechanics

NEW YORK CITY, March 5—Nine of the forty state legislatures now in session have introduced bills providing for examining and licensing, and, in some cases, classifying motor truck mechanics, or licensing garages and repairshops. Others are likely to do so before adjourning. These states include Arizona, Colorado, Connecticut, Idaho, Illinois, Minnesota, Nebraska, North Dakota, and Texas.

The National Automobile Chamber of Commerce, New York City, wishes to obtain the service managers' views, and as a result, is sending out a questionnaire that invites comment.

In general the bills provide for establishing a board appointed by governor, secretary of state, motor vehicle commissioner or department of public works to examine and license mechanics, and forbid others to work on automotive equipment except as helpers to licensed mechanics; fix license fees varying from \$2 to \$10 and fines for violations from \$10 to \$100.

The Idaho and Minnesota bills are different, licensing the garage or shop, instead of mechanics, requiring a bond from the proprietor to protect judgments for damages to equipment worked upon.

### J. I. Case 2-Ton Farm Truck

RACINE, WIS., March 3—The J. I. Case Plow Works Co., this city, has incorporated in its new 2-ton farm truck every worth while feature that will insure its successful operation at general farm work. Every precaution has been taken to protect against dirt and grit. The main frame is made of 6-in. 8-lb. channel iron. There are five cross beams, heavily riveted to the side members, and reinforced at the corners by heavy gusset plates. Two hooks are provided at both the front and the rear, and a bumper is also provided. The latter is pivoted at the ends and is easily swung up out of the way either to crank the engine, or when the belt pulley is in use.

One of the features is the belt pulley, which with the belt power take-off, is mounted at the front of the truck. This is furnished as an extra. It comprises the belt pulley, a pair of bevel gears and a separate clutch.

### Grant Discontinues Trucks

CLEVELAND, March 7—The Grant Motor Car Corp., this city, has discontinued the building of trucks indefinitely. The company will concentrate all of its manufacturing facilities upon the production of Grant passenger cars.

## \$1,000,000 Trucking Concern Planned

### Boston-Philadelphia Dispatch Corp.'s Headquarters Will Be in Springfield

SPRINGFIELD, MASS., March 7—Plans are on foot for the formation of a \$1,000,000 trucking corporation, to be known as the Boston-Philadelphia Dispatch Corp., with headquarters in Springfield, which will be organized and incorporated soon by G. M. Burke.

A route between Boston and Philadelphia, with 6-hour service, is contemplated at present. Terminal centers will be established in the large cities to take care of haulage for surrounding places, covering a radius of 50 miles around each. The mileage covered will be 363, and 175 cities and towns in New Hampshire, Connecticut, Rhode Island, New York and New Jersey will be included in the operating territory. Terminals will be built in the cities selected. The largest will be in Springfield. It is planned to purchase 176 trucks and trailers and to employ 306 men.

Mr. Burke, the originator and promoter of the corporation, has been connected with the transportation department of the New York, New Haven & Hartford Railroad in various capacities for the past 8 years.

### Buses or Trolleys in Norfolk? ✓

NORFOLK, VA., March 3—Motor bus operators and the Norfolk traction company have locked horns in a battle in which, for the moment, the bus operators seem to have the upper hand. The result will be watched with keen appreciation, for the result will mean the future status of the street car and the motor bus.

Norfolk has furnished a unique situation. Briefly, the contest centers about a franchise for furnishing the city with transportation facilities. Will the motor bus operators or the traction company get the exclusive right to operate?

The Virginia Railway and Power Co. for years has been losing ground. Motor buses have been getting the cream of the street railway company's business. The traction company has not been able to expand with the city and has been handicapped by a refusal of the city council to grant increased car fares. New sections of the city were populated and annexed, but the street car company was too poor to extend its lines to reach it. The motor bus companies, though, could serve the new community by adding a few trucks.

And now comes the real test. The buses are taking \$1,200 daily from the traction company in revenues. The franchise held by the latter company is about to expire. The city demands that the traction company extend its lines and take in all sections not now served by it. Unless it agrees to spend \$2,000,000 in improvements, the franchise will not be renewed, the city says.



## Truck License Plan Changed

### New York State Abandons Prohibitive Rates As Impractical—Full Maintenance

ALBANY, N. Y., March 1—Though the proposed plan of taxing heavy-duty motor trucks from the highways of New York has been abandoned as impractical, the State Legislature is proceeding with its plan to enact laws which will place the entire burden of road maintenance upon passenger car and truck owners. Under the tax schedule embodied in a bill introduced Feb. 26 fees are boosted from 50 to 100 per cent.

Included in the provisions of the measure are increases in taxes of 25 to 40 cents per horsepower. Trucks of more than 3 tons' weight are assessed double. On a tonnage of from 2 to 3 the tax is increased from \$15 to \$23.50; 3 to 4 tons the increase is from \$20 to \$40. The 10-ton truck will pay \$110, and the tax on the 14-ton vehicle will be \$140. For every ton in excess of 14 the tax will be \$20.

The tax on trailers is raised from \$5 to \$7.50 where the weight is 2 tons or less, the increase being graduated up to the trailer weighing from 10 to 14 tons, on which a tax of \$60 is levied.

The tax on omnibuses with a capacity of five persons or less is raised from \$15 to \$22.50. Where the capacity is more than thirty passengers the tax is increased from \$67.50 to \$101.25.

It is estimated that the new schedules will yield \$9,000,000 a year, or \$1,000 a mile for the 9000 miles of State highways. About \$6,000,000 was realized from motor vehicle revenues in 1920. Motor vehicle associations are planning to oppose the new rates unless changes are made in the system of administering highway maintenance.

## Trucks Move Plant Equipment

JERSEY CITY, N. J., March 5—An important use of motor truck transportation was recently seen in the moving of the plant of the Safety Car Heating & Lighting Co., from Jersey City, N. J., to New Haven, Conn. The entire operation was performed quickly, work at the new plant being started before operations ceased at the old one, affording partial production continuously throughout the moving program.

The distance from Jersey City to New Haven is approximately 85 miles and the difficulty of making the move without some use of motor trucks was hard to conceive. With trucks used the entire distance, the procedure was reduced to the simplicity involved in moving from one part of a city to another, the only difference being an added day's time during transit.

As soon as the layout of machines in the new plant was determined the work of shipping the tools from the old plant was started. The plan was to take single machines for different purposes first, so

that a new unit of production on a small scale would be established at the new plant before the old system had been seriously interfered with except as to capacity.

A machine tool in operation in Jersey City Monday morning could be dismantled and shipped to the new plant at New Haven and again to be in operation on Wednesday morning. This speed in dismantling, transporting 85 miles and again setting up a large machine was possible only through careful preparation.

## Drastic Truck Insurance Bill

ALBANY, N. Y., March 8—The most drastic and pernicious piece of legislation affecting the motor truck operator, ever introduced in the State Legislature is that known as the Strauss-Still Bill, which provides for what is known as compulsory motor vehicle compensation insurance. This covers all accidents to persons on the highways regardless of fault.

The bill provides that compensation shall be paid "for the disability or death of any person caused by an injury without regard to fault as a cause of injury, except where injury is occasioned by the wilful intention of the injured person to bring about an injury of death to himself or another."

This means that compensation will be awarded though the injured person may be careless or negligent and the driver wholly free from blame. The injured person can choose whether to take compensation as allowed by this law or to sue.

This will result in responsible companies having to carry both compensation and other insurance for their proper protection.

## Would Limit Sale of Army Trucks

### Senate Committee Adopts War Dept. Recommendations to Prevent Dumping

WASHINGTON, March 7—Recommendations of the War Department for the disposal of surplus motor vehicle equipment, placing a limitation upon the number of vehicles to be sold or transferred, were adopted by the Senate Committee on Military Affairs in reporting the army appropriation bill to the Senate Feb. 24. The item, if passed without amendment, would to a large extent block efforts of Congressman Anthony of Kansas to dump army motor vehicle equipment on the open market. The Senate bill specifies that the total transfers and sales during the first six months of the present calendar year must not aggregate in excess of 10,000 motor trucks and 2000 passenger cars.

The House bill, which carried the Anthony provision, required the sale and not transfer of motor vehicles. Under the proposed legislation now before the Senate all points of law are met because under the existing law the War Department must give other Federal departments a choice of trucks.

Because of the fact that the army will have disposed of by sale or transfer 6700 trucks before the bill passes, the Senate amendment would fix the number to be disposed of at 3300. The Anthony bill would require the sale of 10,000 more.

## 1-Ton Republic Express

ALMA, MICH., March 8—The Model 10 Express, a 1-ton truck, is the latest product of the Republic Motor Truck Co., this city. It is equipped with a Continental engine, Torbensen internal gear-driven axle, 35 by 5 pneumatic cord tires, Delco electric lighting, a starting system being extra, and a Bosch high-tension magneto, independent of the lighting system. The price of this new model is \$1,645.

The model is furnished with two styles of express body, either open or canopy-top, an extra tire carrier and rim being included with both styles. The truck is also fitted with full length runningboards, connecting front and rear crown fenders. Complete curtain protection is furnished with the enclosed cab and with the canopy top express body. The cab also includes a two-piece adjustable windshield and is fitted with removable side curtains which open with the doors. This is intended to insure greater comfort to the driver in inclement weather.

## U. S. Truck Price Guarantee

COVINGTON, KY, March 2—The United States Motor Truck Co., this city, has issued a guarantee against a price decrease which will be effective until July 1 of the present year.

## Coming Events

1921

- March 12-19..Boston, Mass., Truck Show, Armory, Boston Automobile Dealers' Ass'n.
- March 14-17..Pittsburgh, Pa., Convention to be held at William Penn Hotel by International Retail Delivery Ass'n.
- March 15....Fort Worth, Tex., Truck Show, Twenty-fourth Annual Southwestern Exposition and Fair Stock Show.
- March 19-26 Detroit, Truck Show, Morgan & Wright Bldg., Jefferson Ave. Under auspices of Detroit Automobile Dealers' Ass'n.
- March 21-26..Torrington, Conn., Truck Show at State Armory.
- March 21-26..Norfolk, Va., Truck Show at Tabernacle.
- March 21-26 Cedar Rapids, Ia., Truck Show at Auditorium.
- March 22-26 Williamsport, Pa., Truck Show at Lycoming Motor Corp. Bldg.
- March 28-April 2..Columbia, S. C., Truck Show at Exposition Bldg., State Fair Grounds.
- April 4-9....Gloversville, N. Y., Truck Show, Gloversville - Johnstown Second Annual Show, Armory under auspices of Company G.
- April 4-9....Seattle, Wash., Truck Show at Arena and Hippodrome.
- Sept 2 weeks Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.



# The COMMERCIAL VEHICLE

*Read by Most Owners*

THE CLASS JOURNAL COMPANY, Publisher

H. M. Sweetland, President  
W. J. Ralph, Vice-President  
A. R. Sweetland, General Manager  
J. P. C. P. P.  
17-211 West 201 Street, New York

## CONTENTS

Vol. XXIV, No. 5

April 1, 1921

### LEADING ARTICLES

- Are You Protecting Your Truck Investment? 137  
Ingenious Methods of Adapting an Old Horse Ramp to Trucks 140

### MISCELLANEOUS ARTICLES

- A 1-Ton Truck Replaces Four-Horse Wagon—and Saves \$5,500 Per Year..... 144  
Somebody Started Everything..... 146

### DEPARTMENTS

- Overhauling the Mack Truck Engines..... 141  
Rear Axle Repair and Adjustments—10 F.W.D. Bevel-Driven Axles ..... 147  
The Better Way ..... 150  
1½-Ton Waltham Built for Quick Deliveries..... 154  
International ¾-Tonner Has Speed of 30 M.P.H.. 154  
Six Super-Truck Models Now in Production..... 155  
Shop Equipment, Time and Money Saved in Truck Repairs ..... 156  
New Accessories and Parts..... 158  
Motor Truck Electric System Wiring Diagram.... 160  
The Fleet Owners' Forum..... 162  
The Editor's Viewpoint..... 166

### NEWS

- Plan Better Service for Truck Parts..... 167  
Railroad Experiments with Motor Trucks..... 167  
Urge Use of Trucks in Harbor Project..... 168  
New York Truck Tax Bill Passed..... 168  
Index to Advertisers..... 86-87

## The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT

David Beecroft, Directing Editor  
Ray W. Sherman, Executive Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879.

### BRANCH OFFICES

Chicago, Malters Building, 59 East Madison Street  
Detroit, 317 Fort Street West  
Cleveland, 536 140 Guardian Bldg  
Philadelphia, 1420-1422 Widener Bldg.  
Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States ..... \$2.00 per year  
Extra Postage west of the Mississippi River on account of Zone Postage Law ..... 50c  
Canada ..... \$3.00 per year  
Foreign Countries ..... \$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Sweetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

## WYMAN GORDON

*The CRANKSHAFT MAKERS*  
WORCESTER, MASS. CHICAGO, ILL. CLEVELAND, OHIO

## The Onward March Continues

IF we had not believed, years ago, that the automotive industry was ultimately to become a vital factor in the economic life of the world, we would not have cast our fortunes in with it.

Nor would we be where we are today if that prophecy had not been fulfilled.

No temporary depression can arrest its progress—there is the irresistible momentum of a world need behind it.

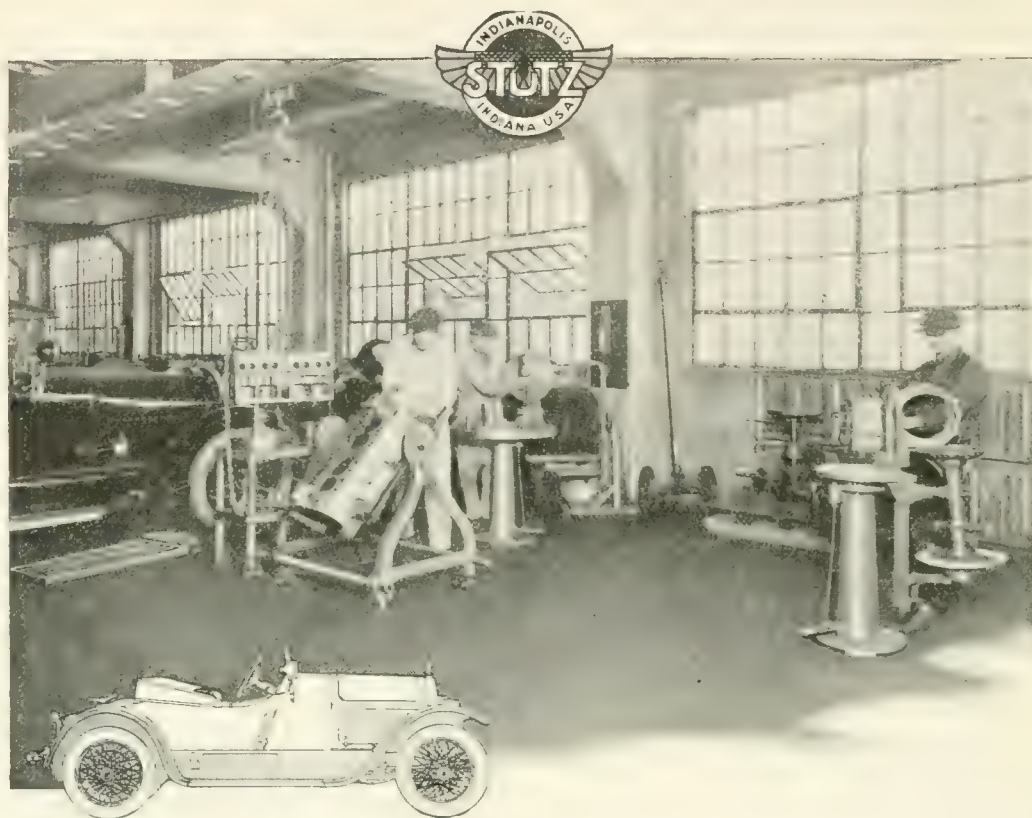


Worcester Division: .. Worcester, Mass.  
Ingalls-Shepherd Division: .. Harvey, Ill.

### DROP FORGINGS

often cheaper than castings

—Always superior



## The Sturdy STUTZ and the Efficiency Standard

At the big Stutz plant in Indianapolis you'll find Continental Shop Equipment aiding skilled labor to build into Stutz cars the high standard of quality for which they are so well known.

And in factories, garages and service stations throughout the country, "The Efficiency Standard" is daily performing the one purpose responsible for its inception and remarkable success—to turn out better work in less time, at a reduced cost.

Continental Shop Equipment will cut your labor costs and enable you to turn out more efficient work. Write for catalog of our complete line.

*Models of*  
 100 Steel Bore Steel Welding  
 Tables, Axle Stands, Wrecking Trucks, Ford  
 Assembly Tables, Ford Engine Stands,  
 Creepers, Riveting Jigs, Radiator Stands,  
 Straightening Presses, Tool Trays, Parts  
 Trays, Bushing Presses, Gear Pullers,  
 Piston Vises, Piston Aligning Devices,  
 and many others.

**CONTINENTAL AUTO PARTS CO.**  
 2304 E. 17th Street COLUMBUS, IND.

**CONTINENTAL**  
*"The Efficiency Standard"*  
**SHOP EQUIPMENT**



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Vol. XXIV April 1, 1921 No. 5

## Are You Protecting Your Truck Investment?

### *What Have You Done About*

- 1—Housing Your Trucks*
- 2—Keeping Them in Condition*
- 3—Getting Full Time Service Out of Them*
- 4—Knowing the Work They Do—or Could Do*

?

**W**HEN a man accumulates money he protects it. He puts it in a bank, a safe deposit box, a safe, or invests it in securities. And these securities he in turn protects by placing them in a safe place.

When a man invests money in a house he protects it. He has it properly wired, to avoid danger from fires. He keeps the roof in good condition to prevent deterioration. He carries insurance so his investment may not be wiped out by fire or other causes.

When a man places any considerable part of his finances in any particular location his custom is to protect these finances, yet the measures to-day taken to protect the enormous investments in motor trucks are not by any means commensurate with the amount involved.

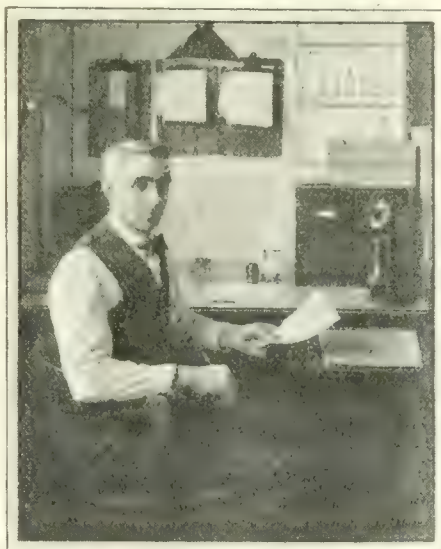
The question is not one of what we commonly understand as insurance, but rather one of measures which the owner of the trucks can take to see that his truck investment lasts as long as possible, gives as good service as possible and does him the greatest amount of good.

Let us assume that we are discussing the business which maintains a fleet of

ten trucks, costing \$2,500 each, a total investment of \$25,000. The average business man with \$25,000 to invest might put it in corporation securities. These he would in turn lock up in a safe place so the investment would be there when he wanted it. He would also watch closely the progress of the corporation and take measures to protect his investment in case dire happenings

seemed possible. Or, if he invested the \$25,000 in a building, he would insure the structure, would man it with proper employees, keep it in good condition and see that the structure brought the highest possible revenue.

The same man, however, might invest \$25,000 in motor trucks and get far from an adequate and possible return from them. He may let the trucks eat themselves up in lost time, in inefficient handling, in excessive upkeep, in poor housing, in poor drivers and countless other ways, whereas it is entirely possible for the return from the truck investment to be greatly increased through attention to fleet management, handling and upkeep.



*A good service station manager is an asset to the mechanics as well as to the owner of the trucks*

### *Buying the Right Truck*

In establishing a fleet, the first problem is, of course, what to buy, and this is not the least of the problems. Much depends upon what is purchased, for a truck of unknown make, or the wrong size, or of too small value for the price, may make all the ensuing problems of the fleet almost insurmountable. Trucks poorly bought are, as an investment, in somewhat the same class as corporation securities whose corporation is not the best. But let us assume that the trucks are well bought by a firm which pays close attention to truck reputation and quality rather than to price, considering good service the main essential.



The next question is where to put them, how to house them. The securities of a corporation in which \$25,000 was invested would be placed in a safety deposit box in a reputable bank. Is there any reason why the trucks, which represent this same amount of investment, should be housed in a dilapidated building, full of fire hazard, poorly lighted, weak in its construction and fit for anything except housing \$25,000 worth of the most modern machinery in the world to-day? Too often the trucks are, in the mind of the owner, just trucks and not machinery or an investment.

Providing a suitable garage for the trucks is sometimes considered not a good business move, because of the cost of providing the building, but is this cost not a direct saving in the end if it provides protection for an investment of considerable size? Is it not as much justified as is fire insurance on the building in which a man lives or does business?

### Housing the Investment

The housing of the trucks should also be looked at from the standpoint of business permanency. With the progress of business, the truck is more and more an essential. In many lines business can no longer afford to bother with the horse and the work and speed that go with him. Trucks are one of the essentials of modern business, and instead of fewer trucks each business house will undoubtedly have more as years go by and business expands. This, then, makes it necessary that the fleet be properly housed in the beginning, instead of waiting for the day when it maintains a size so great that it compels attention to the housing problem.

True, providing a proper house for the trucks may be a certain first cost, but so is building insurance and safety deposit box rental, and protective expenditures of this kind are directly chargeable to the expense of business protection, and are in the end a good investment if properly made.

But caring for the trucks is one of the least of the problems of protecting the truck investment. A corporation security which did not earn a good rate would not be tolerated, and the investment in the security would soon be changed to some other security, if possible, in order that the money invested might be adequately protected. Much the same theory may be applied to trucks. If a truck does not earn a return on the investment, measures must be taken to see that it does. Otherwise, sell the trucks.

Having bought good trucks, having provided a proper house for them, the next problem is to keep them in the best condition, and here comes probably the greatest problem in the fleet field. A truck is of little value unless it is working when it is supposed to work, and if it stands idle because of poor condition and contributory reasons, the investment is not yielding an adequate return.

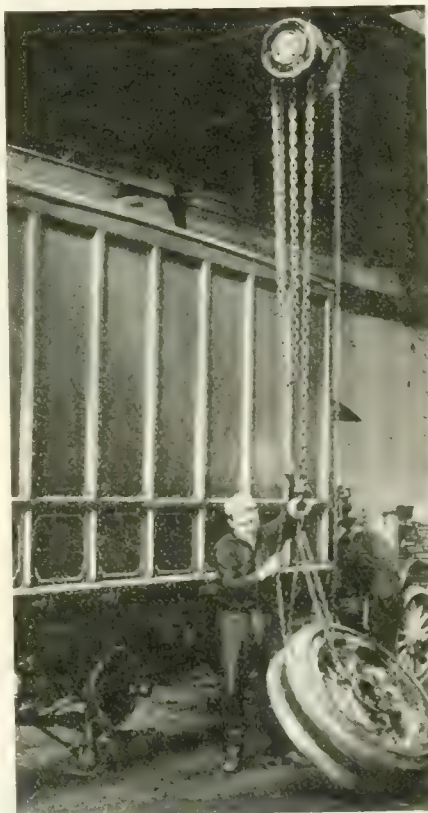
Making the truck work when it should is a matter of truck service, and to handle this problem most fleet owners maintain service stations, but the attention paid to these service stations by

those whose investments are risked is not always in proportion to the interest one would assume should exist.

To have a service station and to have a real 100 per cent service system, are two entirely different things. In some cases, owners of fleets place large truck investments in the hands of unskilled men, and sort of push the problem out the door and consider it solved. Yet the same fleet owner may carefully conserve his investments in other things and hitch these other things onto his business in a highly systematized manner.

### Maintaining the Investment

Having provided good trucks and a good house for them, the fleet owner should then provide proper service station equipment. There are times



*If the truck cannot be started at once the firm's business may be affected—at times equipment pays for itself in a very short period*

when a wheel puller will pay for itself in an hour, and still it may stand idle and unused for days at a time. There are times when a motor, line shaft and certain shop equipment will stand idle, and there are times when, as a reserve for upkeep, it will pay for itself in a few hours. The question of equipment is very broad and worthy of keen study by the fleet owner who has invested thousands of dollars in trucks. The comparatively small amount required for investment protection in the way of service station machinery is worthy of consideration.

Let us assume that a truck is needed badly, and that it breaks down in the middle of the day. If it cannot be started at once the firm's business is

affected, another truck may have to be hired and there may be other expenses due to the failure of the truck to operate. At times like this equipment pays for itself in a very short period.

Some fleet owners may compare their own service stations with those run by public repairmen, but this is manifestly unfair. The public repairman is in business to make money on his repairs, and any equipment he buys must be purchased with the work profit in view. If it takes him 2 hrs. to do the work that a wheel puller would in a ½ hr. he isn't out a great deal, for the hours of labor are paid by the customer.

But with the fleet owner the hours spent without the wheel puller are paid for at an enormously high price in lost time, lost business and other losses. The fleet service station equipment is like the goal keeper in a hockey game. He may stand idle 95 per cent of the time, but when he does keep the puck out of the goal he may save his team from defeat. And so it is in business. Up to a certain point an investment in proper service station equipment is necessary, because it is the goal keeper which saves the game, it rolls the trucks out onto the road again in the shortest possible time and protects the truck investment by getting a maximum return.

Providing equipment, which at first seems almost entirely in the reserve class, is also a better investment protector than it may at first seem, because, with good equipment at hand, a good service station manager is always able to find uses for shop machinery and make it pay its way.

### The Parts Stock

The same applies to parts. What does it cost a fleet owner if his truck stands idle for 10 hrs. while his service station manager makes frantic efforts to get an axle shaft? The shaft, carried in stock, would represent an investment of a few dollars—and has to be bought anyway when needed. Isn't it a tremendous protection of the investment to invest a few dollars in parts in order that the truck may roll when needed and the business be served? Truck parts stocks cost comparatively little and the benefit they may bring in the emergency cannot be measured.

### The Man for the Job

Having bought good trucks, secured a good garage and properly equipped the service station, a very bothersome problem of personnel enters. Getting the right kind of men is not always the easiest job in the world. It is customary with many fleet owners to assume that full charge of the trucks should be given to a man with mechanical experience, whereas it may be that some man with executive rather than mechanical experience would do a much better job. The subject is worthy of serious thought.

Mechanics are essential of course, but unless the affairs of the service station are properly directed the efforts of the mechanics are not of most avail and they suffer in the estimation of the fleet owner. A good service station manager



is an asset to the mechanics as well as to the owner of the trucks. There is here also a great opportunity for the mechanic to advance himself in the world, because he can by studying service station management get ready to rise to the higher position when the opportunity comes, and unless the higher position is properly filled by a good manager the place to which to rise does not exist.

Good managers for fleet service stations can be found in young men of executive ability who like to work out troublesome problems and who are willing to try anything just for the fun of working out of a rough hole.

### Methods Mean Much

There then follows the problem of proper methods. It is possible to cut down lost time enormously by proper shop system and methods, and this part of the job is pretty much up to the manager. In fact, it depends entirely on him. The fleet owner may hire a manager but there his ability generally ends. He can't

driver is a sales contact point, no matter what the line of business. He has to come in contact with the fleet owner's customers and if he makes a poor contact he harms the business and decreases the value of the truck investment.

The driver is just a human being. He must be managed, as he himself will admit, and he likes one kind of management and detests the other. Properly handled he can increase the value of the truck investment. Improperly handled he may cost the fleet owner hundreds of dollars. It is a big problem.

### Interest Will Be Repaid

These are but the high spots of the fleet problem, the protection of the owner's investment. The ramifications of the problem are manifold. They are a job all by themselves. They should have the serious attention of a member of every firm which owns trucks. Of course, in some firms, such as contractors and coal dealers, some member of the firm is generally very close to the trucks, but not all are so fortunately situated, and

ence has been that a really good driver is not a "floater," going from employer to employer, and remaining just long enough to act as an agitator and instill the spirit of dissatisfaction among the other drivers. While I have had some success in hiring experienced drivers, and have procured some good men, the majority of the so-called "experienced" drivers, as a rule, I have found have one large ambition—to break the governor seal and adjust the carbureter, regardless of their ability to handle the mechanical features of the truck. Therefore, to a large extent, I place my faith in the inexperienced, "green" driver, or the man who has never driven before.

My experience has been that a "green" man is an apt pupil and is always open to suggestions. He knows nothing about a truck, and has no desire, or fears to tamper with the parts about which he does not understand. Modern motor trucks are practically foolproof, and if sufficient lubrication, water and fuel are furnished the driver does not require a diploma as a graduate mechanician.



*Where to put them . . . . How to house them . . . . is this cost not a direct saving in the end if it provides protection for an investment of considerable size?*

spend his time seeing that things run right and that things are efficiently done. That is the manager's job.

The same applies to mechanics. Sometimes it is better to take able and willing young men and make mechanics out of them than to hire men who are supposed to be experienced. In many lines of work the character of a man counts for more than his experience.

### And the Drivers

With everything properly equipped and ready to go there must yet be drivers, and probably no phase of the fleet business is more difficult. As was said about mechanics, it probably would be easier to hire alert, gentlemanly, willing young men and make drivers out of them than to make drivers into alert, gentlemanly and willing young men, provided they are not that class.

The driver must be of the right sort if the investment is to be protected. He can ruin the investment in the truck if he wishes, or he can greatly increase the earning power of the vehicle. If he takes pride in it it means much to the owner of the fleet. Furthermore, the

in firms where the trucks seem a remote part of the business a definite system of contact should be established, so that the members of the firm may, by system and contact with the fleet manager, make the trucks an integral part of the business, earning a maximum and becoming daily a greater asset.

Trucks are comparatively new as business machinery. The problems that have grown up about them are great. The investment is large. The work they can do is almost limitless, and a study of this new and growing business activity is worthy of the attention of every individual associated with them, from the mechanic to the man whose money is invested in them.

### Hiring Drivers: An Indianapolis Man Gives His Views

A MAN with brains and brawn, and one not afraid to use either or both, sums up my idea of what a good driver should be.

The driver question has become one of the most complex problems we cartage men have to contend with. My experi-

After interviewing the applicant for a position as driver, and I feel certain that the man is sincere in his desire to work, and will remain in my employ, I send the "green" man out on a truck, together with an experienced mechanic. All of the truck's working parts are explained to him. He is instructed as to proper lubrication and the necessity of keeping the radiator well filled with water. The driving operations are next explained to him. I have found that after one or two days' training the novice is quite well able to handle the truck. I impress upon the new driver's mind that when he goes on a job he must remain on his truck at all times and should render assistance, as far as possible, in loading or unloading his truck.

Some of the so-called "experienced" drivers object to assisting in the loading or unloading of the truck, and prefer to ramble about the factory, or spend the time in slumber, stretched across the seat. I believe that with the present day of curtailed production in all lines of work every person owes it as a duty to himself and his country to WORK. It is the only remedy for bolshevism.

# Ingenious Method of Adapting an Old Horse Ramp to Trucks

*An Elevator Was Too Costly. But the Second Floor Had to Be Used to Store Trucks. How an Electric Motor, a Wire Hawser and an Overhead Track Solved the Problem.*

A LITTLE ingenuity will sometimes convert an old horse stable into a satisfactory truck garage without the expense of complete remodeling and rebuilding. Here is a case in point which is of interest to the small fleet owner.

One of the first principles that a concern must consider before converting its horse wagon delivery system into a motor truck fleet is the garaging of the trucks. With few exceptions, a prospective fleet owner finds that the horse stables can very well be used for this purpose, provided they are completely altered to facilitate quick maneuvering of the trucks during the morning rush periods. Occasionally, the stables can be used to advantage for the dual purpose of storage and repair work, as in the case of the Great Atlantic & Pacific Tea Co., Jersey City, N. J. That company operates a fleet of over 100 Pierce-Arrow trucks.

The particular problem confronting the company in the use of this stable for the machine shop was how to get the trucks up to the second floor without the installation of an elevator, large enough to carry one of its 5-ton trucks. The runway used for running the horses up to

the second and third floors of the building, was wide enough for a truck but too steep for it to negotiate, largely on account of the lack of room for the truck to get a running start on the street. The solution of this problem was the use of a cable line, wound to an electric motor and run on a pulley at the head of the runway so that the trucks could be pulled up, instead of run up under their own power.

This plan worked successfully, however, only as far as pulling the truck to the top of the runway was concerned. It did not take care of the short turning radius from the runway into the machine shop and the consequent difficulty in steering the truck around this abrupt corner. J. L. Black, who is in charge of the maintenance of the A. & P. trucks, conceived the idea of lifting the front end of the truck off the ground by means of a hoist run on an overhead track. This was curved to turn the truck so that it could be steered right into the machine shop.

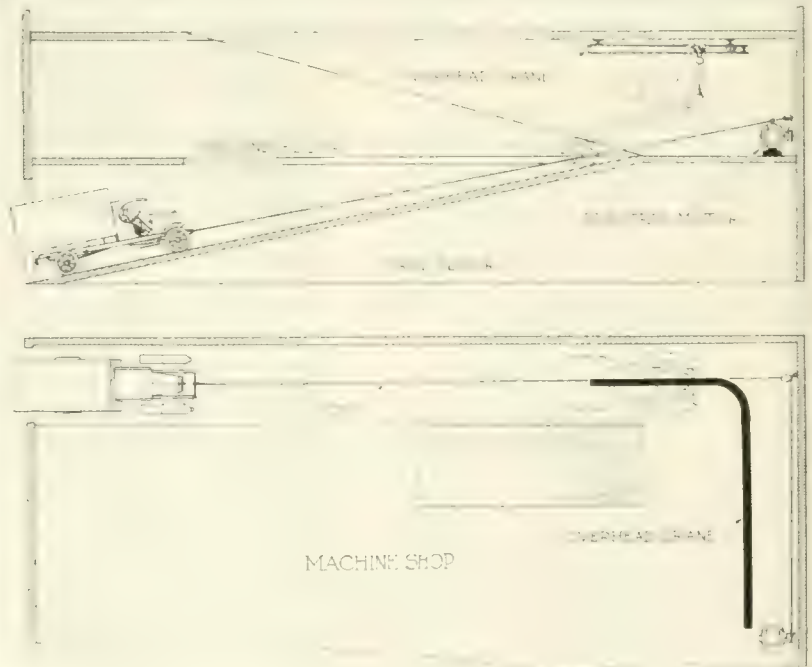
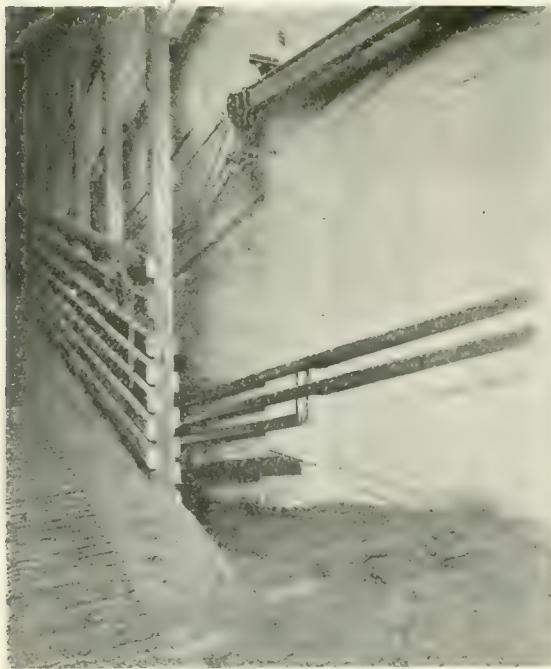
The idea was ingeniously worked out, as the accompanying illustration shows—and it worked excellently.

Small fleet owners as well as large

ones may find an adaptation of this idea a solution to their own problem, if they wish to use an old two-story horse stable for trucks, either permanently or pending the erection of a truck garage.

It is frequently found that where the second floor of a horse stable could only be reached by a runway, the necessity of remodeling the building forbids the installation of an elevator for the trucks. And in most cases the fleet owner recognizes the necessity of using every bit of available space and also recognizes that it is not advisable to go to any considerable expense on an old building which will in time be vacated because of an increase in the size of the fleet or because of the erection of another building.

But with this arrangement, when the old building is vacated the equipment used on adapting the ramp to trucks can be easily transferred to the new building. And it will be easy to place the pulley, the track and the electric motor in the new building where they will be of value. For example, the pulley and track can be used for lifting and moving engines, gearsets and axles, while the motor will serve to furnish power to the power-operated repairshop machinery.



When the Great Atlantic & Pacific Tea Co. in Jersey City replaced horses with trucks, they had an old three-story horse stable on their hands in which to garage the trucks. The top floor was disregarded, but the second floor space was needed for trucks and the horse ramp was too steep for the trucks to navigate. The above illustrations show how an electric motor and a wire hawser, together with an overhead track and a pulley for lifting the front ends of the trucks, solved the difficulty of getting the trucks up the steep ramp and of navigating the sharp turn at the top



# Overhauling the Mack Truck Engines

## What to Do and What Not to Do— Constructional Details Explained

THE trucks made by the International Motor Co., New York City, use two types of engines, called the AB and AC, the former being used in the smaller trucks and the latter in the larger. The AB engine differs from the big engine in that it is of the unit power plant type, while the AC model is arranged for mounting separate from the gearbox. This difference consists of the addition on the AB model of a bell-housing for the flywheel, cast integral with the crankcase, to which the gearbox flange is bolted, and forming an inclosure for the flywheel and clutch. The cooling arrangement of the AB engine is different, having the conventional flat radiator in front and there are differences in the support of the engine. The AC radiator is mounted in the dash cowl and is of circular form.

The two engines being otherwise similar in design makes it possible to apply the same methods in their repair and adjustment.

### Design

Features in connection with the design of the Mack engine include the placing of the exhaust and inlet on the same side, thus permitting the use of but one camshaft; enclosed sealed governor, enclosed valves, and oil piping cast in aluminum case and front cylinder.

Each piston is ground to three different diameters, the smallest diameter being at the top, which allows for the greater expansion of this part of the piston, due to its being subjected directly to the heat of the explosion. The piston rings are peened on the inside, which allows an internal stress in the metal of the rings.

But three timing gears are used in the Mack engines, the crankshaft gear, the camshaft gear, and the pump and magneto shaft gear. These are all cut helical, the latter being at right angles to the crankshaft. The pump and magneto shaft is, therefore, transverse across the front of the engine. This position renders both appliances accessible and leaves the left side of the crankcase free for access to the interior through the hand holes.

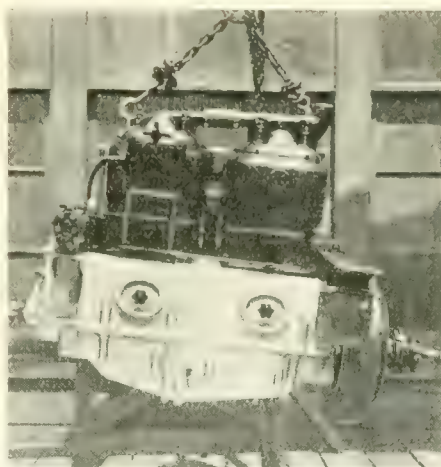
The camshaft is machined from a single piece with the cams and oil pump spiral gear integral. It has three bearings of larger diameter than the cams and of slightly diminishing diameter

toward the rear, so that the shaft may be withdrawn longitudinally from its bearings.

The oiling system is practically dual. Cylinders, pistons, wristpins, crankpins, camshaft, cams, valve lifters and oil pump driving gears are lubricated by splash. Crankshaft main bearings and the three timing gears are lubricated by gravity. The lower crankcase acts as a large oil reservoir, carries the oil pump, has oil troughs cast integral with it and also has fins cast along the bottom to aid in cooling the lubricating oil. The front cylinder has an oil reservoir cast integral with it and which is partly water-jacketed. There are two oil strainers, one surrounding the pump and one in the cylinder reservoir.

### Crankshaft

The Mack crankshaft being case-hardened and 3 in. in diameter, gives it maximum durability. It does not get out of alignment nor do the bearing surfaces of the journals wear. As a result,



*Mack engine, showing the inspection covers*

it is not necessary either to straighten the shaft nor grind the journals.

The main bearings carried in the upper half of the crankshaft should be scraped in with the cylinder blocks and the rear crossmember bolted to the crankcase (upper part) because otherwise when these parts are assembled, the crankcase may be distorted, thus throwing the bearings out of line and destroying the adjustment.

Inspection of the connecting rods, shafts, etc., is accomplished by removing the crankcase inspection covers. This is done by hand by means of wing nuts. It is also possible to feel through

the inspection holes for broken cams or rollers.

In order to get at the bearings, the lower half of the crankcase may be removed without taking the engine out of the truck, as the main bearings are all capped into the upper half of the crankcase. They may then be inspected and adjusted.

The piston and connecting rod assemblies may be removed without taking out the crankshaft, by removing the connecting rod bearing caps. Clearance has been provided for the pistons to pass the crankshaft.

By removing the three main caps, the crankshaft can be removed without disturbing the engine block.

### A Warning

As regards all castings, care must be taken to loosen and tighten all bolts evenly all around to prevent springing of the casting. It is as important to loosen the opposite bolts gradually, taking care not to loosen any one bolt all the way as it is to tighten them in the same manner since failure to do either tends to spring the casting, thereby making it impossible to get a good seating, when reassembled.

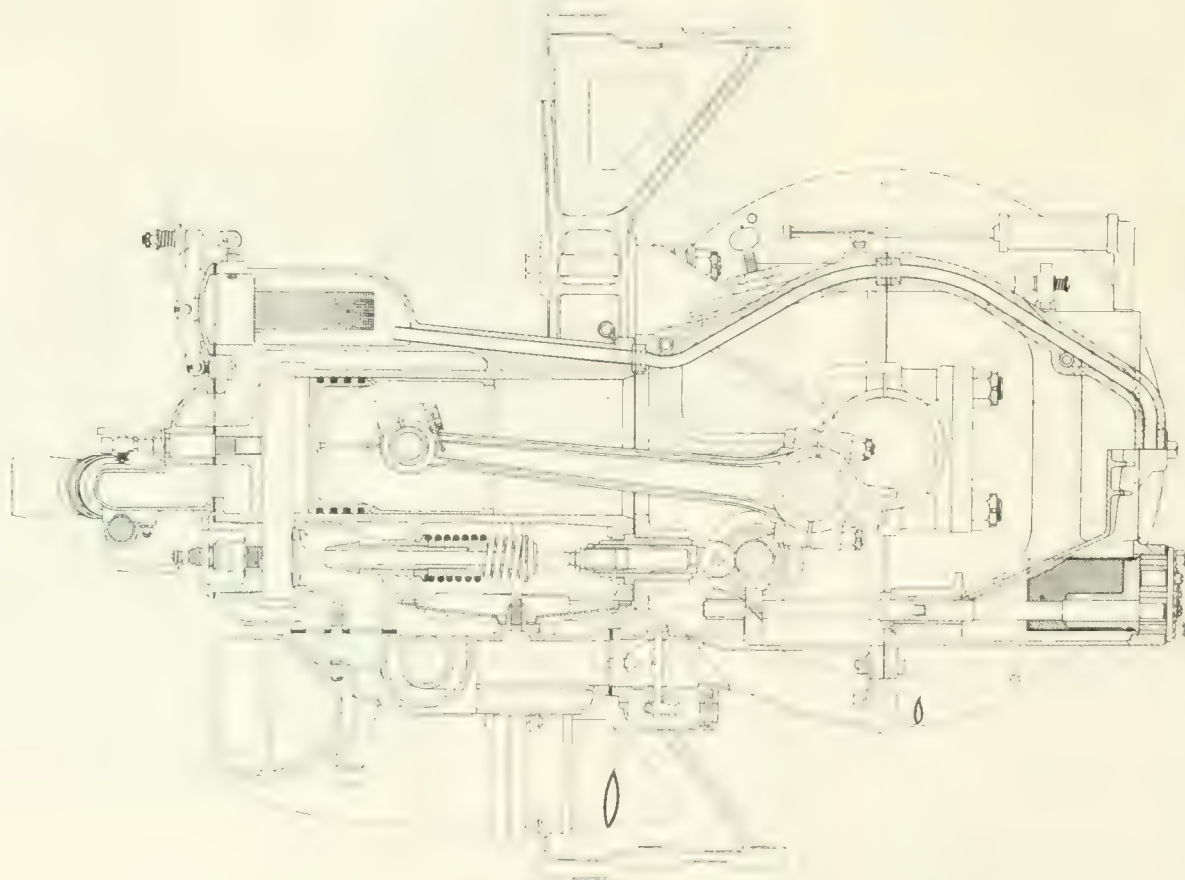
### Connecting Rods

The connecting rod ends should be, so aligned that the wristpin bushing and connecting rod bearings are in perfect line, that is, perfectly parallel. There are two directions in which they may be out of line, that is, the rod may be twisted, so that the wristpin will deviate from alignment with the engine centerline or it may be bent, so that the wristpin will not be horizontal. The former will cause a spiral action of the piston, as well as cocking in the cylinder. The latter will also cause cocking in the corresponding cylinder.

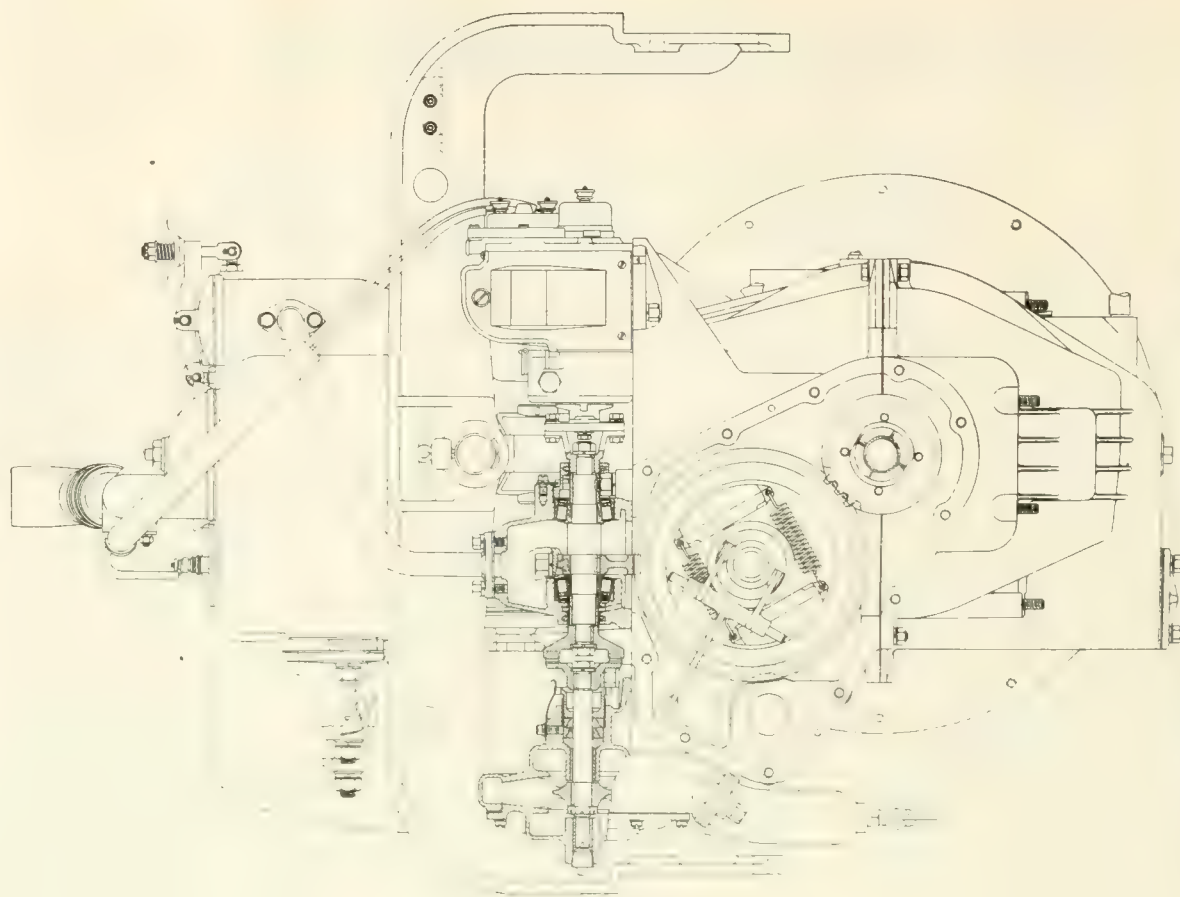
The Mack company suggests a good method of checking up the alignment of the connecting rods. The material needed to make the test includes a pair of V-blocks, a plain block, a surface gage, surface plate, expansion mandrels for the crankshaft ends, special collars for their taper ends and special mandrels for the wristpin ends. All of this equipment is standard and may be purchased of any large hardware store excepting the wristpin mandrels and the collars for the expansion mandrels. The latter are supplied by the Mack company or can be made in the repair shop.

In checking for twist in the rod, the expansion mandrel is inserted through the connecting rod bearing, the collar

## Views of the Mack Engine Showing Constructional Features.



*Mack engine design showing the oil leads and location of strain-crs. The oil reservoir is cast integral with the front cylinder*



*The AC Mack engine, showing the timing gears and the pump and magneto drive. Note the flexible disk coupling on the magneto drive*



fitted on the small end and the mandrel laid on the V-blocks. The special wristpin mandrel is then inserted and bolted fast. The upper end of the rod is then laid on the plain block. The surface gage is then set for the top of the mandrel near one end and then checked at the other end. As this mandrel is 12 in. long, a twist of 0.002 in. at 1/2 in. from the center will show 0.048 in. at the ends of the mandrel.

In checking for bends in the connecting rods, each rod is swung to a vertical position on the V-blocks from the set-up and the surface gage is adjusted for the top of one end of the wristpin mandrel, a check being made on the other end. This checks parallel in a vertical plane in the same manner as in the horizontal plane in the previous test for twist.

A check on the offset of the rod is had by the use of the square, inside calipers and rule. The square is rested on the surface plate with the vertical leg touching the face of the connecting rod bearing. The square is then reversed to the other side of the rod and this measurement is checked, the rule being used to detect any difference. For more accurate measurement, micrometer calipers may be used.

Lubrication System

The lubrication leads require no attention and are not renewable as they are cast integral with the crankcase and the forward cylinder block. The only attention necessary is the cleaning of the strainers, which should be removed when being cleaned. The strainer in the oil reservoir on the left side of the front cylinder block may be lifted out by the fingers. The strainer around the pump is removed only after four cap screws have been taken out when the pump assembly and strainer drops out on the lower right hand bottom of the crankcase.

Pistons and Rings

When the cylinders have been rebored, care should be taken in the measurement of the pistons. These are stepped or tapered so that a micrometer reading at the top might mislead a mechanic. He should measure the skirt for reboring. In fitting the rings to the pistons, after the cylinders have been rebored, the mechanic can use the bore of the cylinder as a guide. Care must be taken, however, that the ring is horizontal and not cocked. Otherwise the clearance will be lessened. Measurement can also be made with a feeler gage.

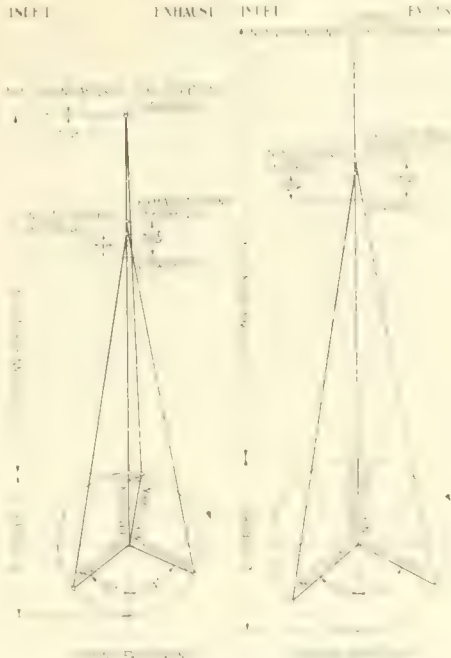
By dropping the bottom half of the crankcase, which carries no bearings, neither the crankshaft nor camshaft is disturbed, and it is possible to disconnect and remove all four pistons without disturbing either shaft.

Water Circulation

The water is circulated by a bronze centrifugal pump of the balanced rotor type. By "balanced" is meant that the water is taken in on both sides of the rotor, eliminating thrust. The pump has no grease cup and is packed with a cir-

cular packing which comes cut to size and is easily inserted in its gland.

The packing used is a compound of hemp and graphite, so that while maintaining a water seal it also lubricates



Left—Valve timing of AB engine.  
Right—Valve timing of AC engine

itself. Adjustment is made by means of the gland nut with a serrated edge retained by a steel spring dog. The water leads are adjusted by tightening the nut or repacking.

Occasionally, after adjustment has been made, the stuffing box continues to leak. In that case, back the nut entirely off, remove the old packing with a wire hook and insert new packing which is

Clearances in Inches

AB & AC	
1—Connecting rods (side) ..	.003 or .004
2—Connecting rods (around shaft) .....	Should fall with weight of piston
3—Main bearings (side)	
Front (outer side).....	.015 to .031
Front (inner side).....	.005 to .007
Center .....	.003 to .005
Rear (outer side).....	.015 to .031
Rear (inner side).....	.005 to .007
4—Around shaft of main bearings .....	.001 to .002
5—Wristpin in piston.....	.001 to .0015
6—Piston .....	.001**
7—Camshaft (end) .....	.002 to .006
8—Camshaft (around bearing) ..	.001 to .003
9—Valve in guide (inlet).....	.001 to .002**
10—Valve in guide (exhaust).....	.002 to .004

\*AC clearances are .004 or .006.  
\*\*AC clearance is .005.  
\*\*\*AC clearances are .0015 or .002

split for the purpose. Press it in with the finger and follow up with the nut, starting with a light pressure. Then run the engine and tighten until all leakage stops. This whole operation can be performed without disturbing the pump or drive connections.

It is advisable to purchase good water

joints. These joints must have rubber on the inside to prevent rotting of the fabric. But if the rubber is of a low grade, it will flake or disintegrate and clog the water system.

Magneto

Owing to the accessibility of the magneto and pump in front of the engine, the usual inspection and repairs can be accomplished with these units in their regular positions. The magneto drive is by a flexible disk coupling which has a serrated fork that permits of adjustment at the coupling. When necessary to send the magneto away for repairs, it can be easily dismounted by loosening four holding down bolts and the coupling.

Exhaust Valves

The exhaust valves are harder than tooled steel and as a result can only be ground when refacing is necessary—not cut on a lathe. When working on the valves, it should be remembered that the Mack engineers have provided that the cylinder volumes are made equal by using valve caps of varying depths to compensate for small inequalities in individual castings. Therefore, do not transfer or mix the valve caps in reassembling.

Engine Removal

The AC engine support at the rear consists of a steel beam which is secured to the engine by through bolts which retain the rear main bearing cap, thus supporting the crankcase and crankshaft directly instead of through arms or projections on the case. At the front a fitting, similarly suspended from the through bolts retaining the front main bearing, carries a universal joint attached to an arched steel beam which supports the front end of the engine. This gives the engine a three-point support, with the front suspension entirely free to give to the weaving of the frame.

The cross shaft may be removed from the engine by loosening three hold-down nuts and the overflow pipe from the oil reservoir which will allow the cross shaft spiral gear housing to be withdrawn, bringing the cross shaft and its gear with it. The pump and magneto do not need to be removed, but their couplings must be loosened.

At the front of the frame the forward brackets for the front springs are heavy castings which serve as a base for the front cross-member. This cross-member is an arch-shaped member which fulfills the office of bumper and protector of the steering connection and springs from any object striking them in front. Four bolts hold this bumper in place.

Removal of this bumper opens the front end of the frame so that the engine complete with its support arms assembled may be slid out of the frame channels onto a stand.

It is also necessary to take off this bumper to get at the timing gears while the engine is still in the truck. After this has been done, the timing gear cover plate is taken off, exposing the timing gear and governor which is part of the

(Continued on page 168)

# A 1-Ton Truck Replaces Four Horse Wagons —And Saves \$5,500 Per Year

**How Accurate Cost Keeping Demonstrated to One Fleet Owner That His Investment in a 1-Ton Truck Instead of Horses Was Equivalent to 5½ Per Cent on \$100,000**

THE argument has been frequently advanced against the motor truck that—while on hauls of any considerable distance it is far more efficient and economical than horses—on short hauls involving many stops the horse is still supreme.

Doubtless there is a certain amount of truth in this, in certain cases. For example, it would seldom prove economical to use a truck for delivering milk from house to house. This is work where stops are continuous, where there is no necessity for covering a great amount of ground in a short space of time and where the vehicle is actually moving less than 50 per cent of the time.

But even though the horse may be more economical in certain instances, there are many types of haulage and delivery where horses are still used instead of motor trucks through an entirely mistaken idea of economy. For in many such cases trucks are actually cheaper and more efficient.

## Frequency of Traffic Stops

Sometimes the users of horses base their argument on the number of delivery stops. Sometimes they base it on the number of traffic stops to which the vehicle is subjected. But neither delivery stops nor traffic stops will always destroy the truck's advantage, as the following instance goes to show.

The Imperial Japanning and Enameling Co. of Chicago, has saved regularly over \$18 a day on its deliveries by replacing four single horse delivery wagons with a single 1-ton truck.

"Besides," as one of the firm goes on to say, "the truck enables us to give better service to our customers and also serves to show them that we're an up-to-date concern."

The truck was purchased over 2 years ago. Since that time, it has been operating on an average of 305 days a year and has cost exactly \$76 for repairs during the 2 years.

## Truck Is Always Loaded

The truck is used for delivering to the firm's customers, the finished enamel work—bicycle frames, automobile radiators, fenders and many other products requiring a high grade finish. The truck is always reloaded with unfinished parts of the same sort for delivery to the firm's plant. Consequently it averages a ton load each way. This is an important feature in operating a truck economically and a fleet owner who can

keep his truck fully loaded all or most of the time, eliminating the unloaded run so far as possible, will have accomplished a great economy in motor truck haulage.

Every day the 1-ton truck makes six round trips, each of which requires twenty-six pick-up and delivery stops. The routes travelled necessarily take it

into Chicago's most crowded business section, where traffic blocks are frequent. Many of the scheduled stops require it to go into alleys, also, where there are often long delays.

In spite of these handicaps, the truck covers 45 miles per day, getting 8.81 miles on a gallon of gasoline.

The operating cost of the 1-ton truck,

The Commercial Vehicle—Truck Cost System			
Year		Month ending <u>Sept. 30</u> 19 <u>20</u>	
Make of truck		<u>Service</u>	
		Gasoline Electric	
MONTHLY COST SUMMARY SHEETS U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline	<u>1559</u> gals.	@ <u>\$ .25</u>	\$ <u>389.75</u>
Current	_____ kw.h.	@ _____	_____
Oil	<u>306</u> qts.	@ <u>\$ .15</u>	\$ <u>45.90</u>
Grease	_____ lbs.	@ _____	_____
Kerosene	_____ gals.	@ _____	_____
Waste	_____ lbs.	@ _____	_____
Dist. Water	_____ gals.	@ _____	_____
Driver	<u>305</u> days	@ <u>\$ 5.97</u>	\$ <u>1820.00</u>
Helper	_____ days	@ _____	_____
Mechanic	_____ hrs.	@ _____	_____
<b>A—Total Operating Charges</b>			\$ <u>2255.65</u>
<b>Maintenance Charges</b>			
*Tires	<u>13,725</u> miles	@ <u>\$ .0166</u>	\$ <u>227.83</u>
Repairs	<u>13,725</u> miles	@ <u>\$ .0138</u>	\$ <u>189.40</u>
Overhauling, painting, etc.			
Spare vehicle rental			
Garage rental (pro rata)	@ <u>\$ 17.50 per month</u>		\$ <u>210.00</u>
<b>B—Total maintenance charges</b>			\$ <u>627.23</u>
<b>Fixed Charges</b>			
Insurance, fire	@ <u>\$ 125</u> per year		\$ <u>125.00</u>
Liability	@ _____ per year		_____
Collision	@ _____ per year		_____
Interest	<u>6</u> % (On Item 1—12)		\$ <u>87.84</u>
Depreciation on chassis	@ <u>\$ 75,000 mile life</u>		\$ <u>415.87</u>
Depreciation on body	@ <u>\$ 2274.50 @ .0303</u>		\$ <u>40.00</u>
Depreciation on equipment	@ _____		_____
*Depreciation on tires	Taxes <u>\$ 30</u> License <u>\$ 10</u>		\$ <u>40.00</u>
<b>C—Total fixed charges</b>			\$ <u>668.71</u>
			\$ <u>3551.59</u>

\*Note: Omit one of these

The complete costs for one year on a 1-ton truck operating in Chicago, laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. The operators of this truck have adopted the mileage basis throughout, in estimating tire costs, repair costs and depreciation. The actual repairs were about \$76 in 2 years



including driver's salary, interest, depreciation, taxes, license, insurance, garage rent and all other items, works out at \$11.64 per day. The entire costs for the year are laid out on these pages on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. The facts and figures here quoted are reprinted through the courtesy of the Service Motor Truck Co.

The truck, then, costs \$11.64 per day to operate. But it would take at least four single horse wagons to do the same work. This has been proved by the fact that the truck takes care of as many or more deliveries now than were handled by four single horse wagons in the past.

A very conservative estimate on the cost of operating a single horse wagon would be \$7.50 per day, including all cost items. For many firms in Chicago and New York who still use horse wagons

are paying as high as \$10 per day.

But even at \$7.50 per day, four horses and four wagons originally cost the firm

What the System Costs

On this page is shown a filled-in sample sheet of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets, is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

at least \$30 per day to operate. This is a little over \$18 more per day than the cost of the 1-ton truck.

Supposing that the four horse wagons are able to operate at least 305 days per year, this means a saving, on the part of the truck, of \$5,490 dollars during the year.

But a reference to the cost sheet on page 145 shows that the total original cost of the truck was \$2,440. At a yearly saving of \$5,490 this means that the truck, by comparison with the old method, paid for its original cost twice over in the first year and has paid for itself twice more since.

Equals 5 1/2 % on \$100,000

There are other interesting points in connection with this investment. The \$5,490 which the truck saves yearly is 5 1/2 per cent interest on \$100,000. Since the truck more than paid for itself the first year and is certainly good for 5 years altogether, it may be said to be paying the firm 5 1/2 per cent interest on \$100,000 for a period of 4 years. In other words, an investment of about \$2,500 is paying a return which would be received from an investment of \$100,000 in 5 1/2 per cent bonds that had 4 years to run.

Here is another point. In these days, a single horse rig, including horse, wagon and harness, would cost at least \$600. Four complete horse rigs would therefore cost \$2,400, or practically the same original cost as the 1-ton truck.

Moreover, not only do the four horse rigs actually cost over twice as much as one truck to operate, but there is an additional expense in routing four drivers instead of one. The actual money saved here is difficult to estimate. But it is obvious that the time saved in handling one driver instead of four, helps materially to reduce the chance of error in the shipping room and insures prompter and better service for the firm's customers. Points such as this must always be taken into account in favor of the truck.

Truck Has Another Advantage

Here is another advantage in the truck's favor, which is well expressed by a member of the firm: "During the last 2 years, our business has expanded rapidly and it is continuing to grow. If we were using horse delivery wagons, we should have to add at least one wagon a year and break in a new driver to our work. Our Service truck easily handles all our present deliveries and still is not working at full capacity. And we feel it gives us much better prestige with the trade to be using a fast motor truck rather than four poky one-horse wagons."

One last word: Remember that it would have been impossible for this firm to tell the relative advantages of a motor truck if they had not kept accurate costs on the truck ever since they bought it!

Too great stress cannot be laid on this point, because there are still many fleet owners who do not keep accurate costs on their trucks.

The Commercial Vehicle—Truck Cost System

Number of Truck \_\_\_\_\_

Capacity in lbs. 2000

Chassis No. \_\_\_\_\_

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK

Investment

Cost of chassis, less tires

2,084.50

Cost of body

175.00

Cost of equipment

Freight

15.00

Cost of tires

165.50

Total cost, complete

2,440.00

Performance Record

2—Days operated

305

3—Days idle

60

4—Days maintained (Item 2—Item 3)

365

5—Total hours operated

2440

6—Total miles covered

13,725

7—Total trips made

1,830

8—Total tons or packages or stops

(Estimated)

3,660

Performance Averages

9—Average miles per day maintained (Item 6—Item 4)

37.6

10—Average miles per day operated (Item 6—Item 2)

45

11—Average miles per trip (Item 6—Item 7)

7.5

12—Average tons, stops or packages per trip (Item 8—Item 7)

2

13—Average commercial ton-miles, package miles or stop-miles per trip

7.5

Recapitulation

14—Total expenses for month (Sum of Items A, B and C)

\$ 3551.59

15—Cost per day operated (Item 14—Item 2)

11.64

16—Cost per day maintained (Item 14—Item 4)

9.73

17—Cost per mile operated (Item 14—Item 6)

26

18—Total commercial ton-miles, package miles or stop-miles (Item 7 x Item 13)

13,725

19—Cost per commercial ton-mile, package mile or stop-mile (Item 14—Item 18)

26

For a truck operating under crowded traffic conditions the performance record of this truck is unusual. In spite of traffic stops it averaged 45 miles a day. Moreover, the 305 days operated, out of 365 is a good average and the fact that the loading of the truck was organized so that it was fully loaded both ways had a good deal to do with reducing the cost per ton-mile

# Somebody Started Everything!

Old Hammerhead Talks About Education and—Brains

By SINCLAIR GLUCK

“WELL, Huebsch, how goes it?”  
“Pretty well, sir.” The mechanic sat down gingerly.

Silas Gunther, shrewd old president of the big commercial house, turned in his chair smiling.

“Any idea why I sent for you?” he asked.

The mechanic shook his head. Gunther was known as Old Hammerhead to his men, because of his unerring skill in hitting the nail on the head. It was a habit of his to hold frequent talks with this man or that and so keep in close touch with those under him. But the talks were usually friendly talks, though sometimes painfully incisive, and Huebsch felt a bit nervous as he sat and waited.

“Well, I’ll tell you,” Old Hammerhead replied, “Ross was talking to me about your suggestions as regards new machinery, yesterday. You remember?”

The mechanic started a little in his chair and his lips curled into a somewhat sickly smile. “I—I—Ross was right about that, sir,” he began, “but I thought—”

Old Hammerhead waved his hand, smiling his big genial smile.

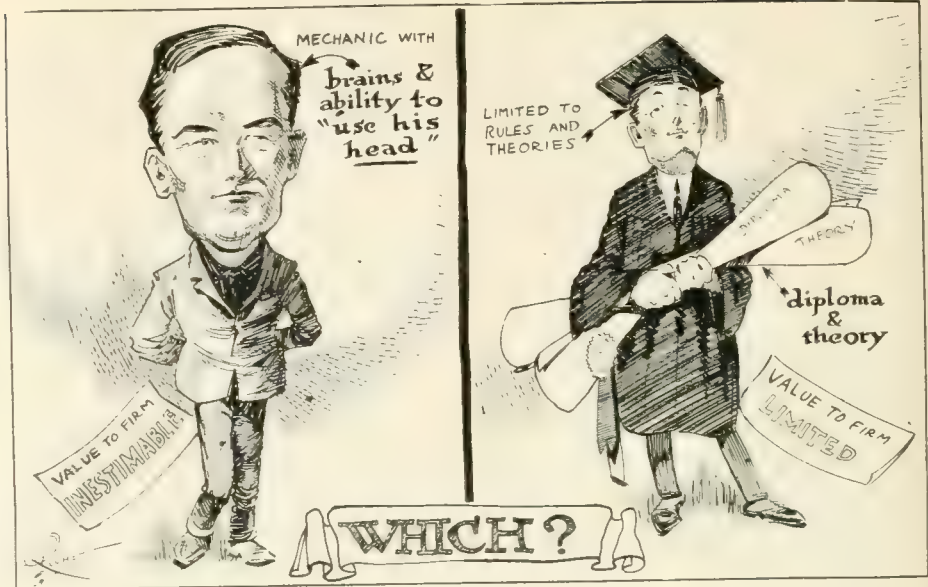
“That’s all right, Huebsch. You thought the job needed a lathe and Ross showed you how it could be done on a drill press. If Ross didn’t know more than you do, he wouldn’t be fit to be your boss. And don’t imagine he complained about you. He didn’t. He came in to ask me what I thought about getting a lathe and I told him no. We don’t use a lathe often enough to buy another one—and for special jobs we can always use one of the lathes at our own factories. Then I asked him why he thought of it and he told me about this job. That’s all.”

Old Hammerhead paused and glanced out of the window, while the mechanic settled back in his chair, relieved.

“But I sent for you,” Old Hammerhead went on, “for a little talk on repairing in general and on the point of view it seems to me a mechanic ought to have. I want to know your opinion.”

Huebsch straightened up in his chair, looking somewhat puzzled.

“Yes,” the old man went on, “I think the point of view is important. Let’s get at it this way. Suppose you ran a repair shop and had a vacancy for a



mechanic. Suppose two mechanics applied for the job, one of whom you knew to be a real expert in the theory and practice of all kinds of repairs and the other less well educated mechanically but cleverer and more ingenious in applying what he did know. Which would you choose?”

“I—I suppose I’d take the expert, if I could get him for the same salary.”

Old Hammerhead smiled. “Well, I wouldn’t, Huebsch. I’d take the man with the brains rather than the man with the education, every time.

“Education is a fine thing, Huebsch—but brains are better. And a man who has made himself letter perfect in all kinds of repairs and then sits back and does his repairs the way he’s been taught and no other way, won’t be as valuable to the firm as the man who starts with a little sound knowledge and learns to apply it as he goes.

“You see, Huebsch,” Old Hammerhead went on, “the thing that makes a man ingenious and so makes him valuable to the firm is a good deal a question of his point of view. If a man says that he hasn’t got the tools he usually does a job with and so the job can’t be done, he’s not going to be so valuable to the firm as the man who says to himself: ‘I haven’t got the usual tools for this job. What else can I use?’”

“Now don’t imagine, Huebsch, that I’m kicking because you went in to Ross and told him that you thought we ought to have a lathe. I like to have you make suggestions and I’d be a fool if I didn’t listen to suggestions from the men in touch with the work.

“But your point of view was wrong. Do you see what I mean? You said that the job couldn’t be done without a lathe. What you might have done was to worry out how it could be done, or failing that, to go and ask Ross if he could think of a way to do it—with the tools you had. Do you see?”

The mechanic cleared his throat. “Yes, sir, I think so,” he said.

Old Hammerhead nodded, smiling. “Look here, Huebsch, sometimes I like

to look back at history—at the history of the world as far as we know it or can guess it. It’s a wonderful thing to realize that every single thing that’s in the world today, aside from the plants and trees and growing things, had to be started by somebody.

“Did you ever think of that? Of course the scientists will tell you that these things evolved, as they call it. But that doesn’t make any difference. Somebody started the idea—somebody started the way to do it—or to make it—or to apply it. And the man who first started the idea of a house or a boat or a fire or a knife had nothing in his education to guide him.

## Don’t Let George Do It

“Did you ever think of that? Did you ever stop to think that somewhere back in history there lived a man who invented the house you live in, the food you eat, the fork you eat it with, the boots you walk in and rest of it?”

“Here’s the point, Huebsch. If those old fellows had sat back and done things in the same old way, just because they always had done them that way, why we’d still be running around in the woods or hanging from trees, if there were any of us left at all.

“And if they’d made up their minds that there was a better way to do things and had then sat back and waited for somebody else to think of it—why—we’d be just as badly off.

“But they didn’t, Huebsch. They used their poor glimmering common sense and the few brains they had as well as they could—and civilization is the result. And it’s up to us to carry on the good work. Not to sit back and let George do it, but to do it ourselves, as well as we know how and if possible a little better than it’s ever been done before. That’s the point of view, Huebsch. That’s the thing that makes a man valuable.”

And the young mechanic went back to his bench with a firm determination to do it himself next time—and better than it had ever been done before!



# Rear Axle Repair and Adjustment

*A Series of Articles to Assist Maintenance Superintendents in Carrying on Axle Repairs*

## 10—F. W. D. Bevel-Driven Axles

**B**OTH axles used on the F.W.D. truck made by the Four Wheel Drive Auto-Co., Clintonville, Wis., are of the full floating, bevel gear-driven type. Steering is by the front wheels only. The emergency brakes operate on brake drums bolted to the rear wheels. With the exception of the steering and emergency braking features, the two axles are similar in construction, many of the parts on the assemblies being interchangeable.

### Adjustment of Differential

The differential is mounted on two roller bearings supported in the axle housing. There are two adjusting nuts on each differential main bearings, by which the differential may be adjusted in relation to the pinion shaft. This adjustment is locked at the factory by means of lock dogs and should be altered only by an experienced mechanic.

The pinion shaft is supported by the inner thrust bearing in the differential housing and by the differential outer

bearing bushing. This bushing should be set up tight against the bearing and backed off at least a quarter turn so that the pinion turns freely but without end play.

A lock nut with a plate washer is used to secure this adjustment. A set screw is tapped into the bearing bushing through the housing to prevent the bushing from turning. A similar screw binds lock nut to the bearing bushing.

In order to disassemble the rear axle, proceed as follows:

1—Remove the axle universal joint. This is done by removing the grease caps, the locking pin and the universal joint straight pin. Then remove the nut that holds the joint to the pinion shaft and remove the joint from the shaft.

2—Remove the set screw and the bearing bushing lock nut.

3—Remove the bearing bushing steel washer.

4—Remove the bearing bushing lock stud which will be found back of the torsion collar.

5—Remove the bearing bushing and pull out the pinion shaft.

6—Raise the truck off the floor and block same up under the rear end of frame.

7—Remove the wheels by taking off the hub caps, driving spiders, skein nuts and washers.

8—Remove the brake bands by taking out the bolt and springs. Then remove the anchor stud nut and the yoke pin.

9—Remove the torsion collar stud nut, upper and lower, and the torsion rods.

10—Remove the spring clips and axle from under the truck.

11—Remove axle shafts.

12—Remove upper and lower truss rods.

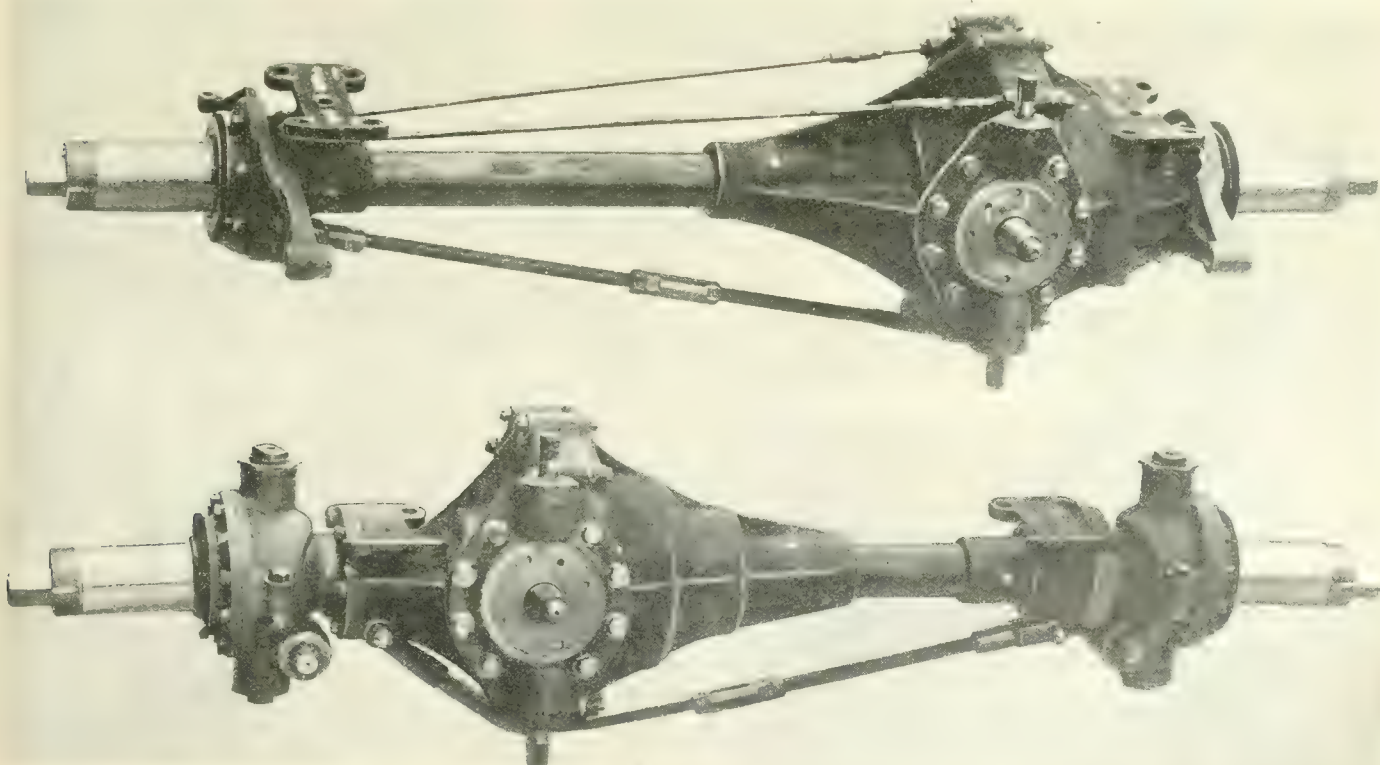
13—Remove differential housing bolts, pull housings apart and remove the differential.

### Assembling Axle

1—Place the right hand housing in a vise in an upright position.

2—Place pinion shim on the pinion shaft and assemble the inner bearing and outer bearing.

3—Place the pinion with the bearings in the housing and screw in the bearing



Views of the two F. W. D. axles. Above—The rear axle. Below—The front axle, showing the steering sockets



bushing. Draw up the bushing so that the pinion will rotate freely.

4—Assemble the differential main bearing on the differential and place the main bearing race in the differential housing. Lift the assembled differential into place in the housing. Care must be taken that the back of the pinion teeth come flush with those of the ring gear. If they do not line up, a thicker or thinner pinion shim must be used. It is important that there be no end play in this shaft.

5—Set the differential retainer adjusting nut, lower or right hand, snug against the bearing. Adjust the nut until the pinion rotates freely in mesh with the ring gear. If it does not rotate freely or if too freely, lift out the differential and re-set the adjusting nut. Repeat the differential and try again. Proceed in this manner until correct adjustment is made.

6—Leaving the left (upper) main bearing about 1 in. from the adjusting nut, place the left housing in place and bolt together. This gives the proper adjustment on the left main bearing. Try the pinion shaft to see that it rotates freely all the way around the ring gear.

7—Remove the left housing and set the left (upper) adjusting nut snug against the bearing and lock same in place. Also lock the right (lower) adjusting nut.

8—Place the left housing in place again and bolt together.

9—Remove the pinion and try the differential for end play. If there is end play, remove the housing and re-set the adjusting nuts. If none is found, place the pinion in place again.

10—Countersink the bearing bushing for the lock screw. The bushing should be center punched after the proper adjustment has been made, and a  $\frac{3}{8}$ -in. hole  $\frac{3}{8}$ -in. deep drilled into it (for point of set screw). Screw in the lock screw and wire same to the torsion rod collar bolt.

11—Put the bearing bushing steel washer in place.

12—Replace the bushing lock nut. Drill with a 5/16-in. drill through the steel washer and into the bearing bushing and replace the hollow head set screw. Be sure to replace the felt washer when assembling.

13—The axle is now ready to be placed under the truck.

The tools required for the disassembling and assembling operations are as follows:  $\frac{3}{8}$ -in. drill; 5/16 in. drill; breast drill; one pair of pliers; two 7/16-in. end wrenches; spring clip wrench; hollow head set screw wrench; hub cap wrench; skein nut wrench; adjusting nut wrench; differential spanner wrench; center punch; hammer; bench vise; punch; and a horse and blocks for blocking the track.

### Hub Bearing Adjustment

In the adjustment of the hub bearings, it will be found that there is a hexagon skein nut which is screwed up against the bearing. This skein nut, during the course of the adjustment, is turned back

half a turn. A lock washer with two projections on the inner circumference is placed on the skein, with projections in the slots provided on the skein.

A second hexagon nut is used as a lock nut, caution being taken not to disturb the adjustment of the set nut, after which the plate washer must be bent against the inner nut and forward against the outer nut at different points on the hexagons. This will form an effective lock to prevent the nuts from turning. It is obviously necessary that this washer be straightened out when the skein nuts are to be moved. Extra

bolt which holds the brake band springs, in place. Then remove the bolt and springs and washers.

3—Remove the brake lock nut and the adjusting nut from the brake adjusting screw.

4—Remove the brake link pin which goes through the two brake links and the emergency brake lever. The bank can then be removed for relining.

5—It is best to use a thin cold chisel when removing the old brake lining. Cut the rivets by driving the cold chisel between the brake band and the lining. Drive out the ends of the rivets with a small punch.

6—Take the new brake band lining which is 43 in. long and place it inside the brake band, so that the lining is snug against the brake band. Punch two holes in one end of the lining in line with the two holes in the end of the band. Then take two brake band rivets, either copper or aluminum, and rivet the end of the lining to the end of the band. Care must be taken in starting to rivet the lining to the band to see that the lining is in perfect alignment with the band, or the brake will be useless after it is reassembled. After one end of the lining is riveted to the band lay the band on the bench and press the lining snug to the band. Grasp the free end and hold it fast to the band, pulling the center of the lining away from the band so that the lining will make a letter V with the open part toward the band.

Now slide the free end of the lining about  $\frac{1}{4}$ -in. to the center of the band and punch two holes in line with the holes in the end of the band and rivets. Press the lining up against the band and it will fit tight. Punch holes for the rest of the rivets and rivet to the band.

When relining brakes, always put the rivets through the lining first, so that the hammered head will be on the outside of the brake band. When relining brakes the band should never be hit a blow with a hammer. This will dent it, making the brake useless. When riveting, it is best to stand a  $\frac{3}{8}$ -in. or 7/16-in. punch on end in a vise and use this instead of a block. A punch will sink the rivet head into the lining and the rivet head will not come in contact with the brake drum until the lining is nearly worn out.

7—To readjust the brake, turn the lower brake adjusting nut down as far as it will go. Then turn the upper adjusting nut down until the brake band is tight on the drum. Back off the upper adjusting nut, until the brake band is free, or about three turns. Then turn up the lower adjusting nut as far as possible and screw the brake lock nut tight against the upper adjusting nut.

### Tools Required

The tools required for relining the brakes are as follows: hammer; pair of pliers; 7/16-in. punch about 8-in. long;  $\frac{1}{8}$ -in. taper punch;  $\frac{3}{8}$ -in. S. A. E. wrenches; jack and handle; hub cap wrench; skein nut wrench; thin cold chisel; and brake adjusting wrench.

### Axles Described in Previous Issues

*Maintenance superintendents who wish to refer to articles on axles that have already been described will find them in the following issues:*

1920

1—Timken.....Nov. 1

2—Clark.....Nov. 15

3—Packard....Dec. 1

4—Wisconsin...Dec. 15

1921

5—Ford (Bevel)

Jan. 15

6—Ford (Worm)

Feb. 1

7—Sheldon...Feb. 15

8—Walker....Mar. 1

9—Schacht...Mar. 15

10—F. W. D..This Issue

washer plates are furnished in each tool box.

In removing or putting on wheels, great care should be taken to keep the bearings and hub free from grit. For any grit in the bearings will soon ruin them. It is advisable to wash the skein and bearings with gasoline before re-stalling.

All four wheels are interchangeable, it being only necessary to remove the brake drum and substitute a hub flange to use a rear wheel in place of a front.

### Relining Emergency Brakes

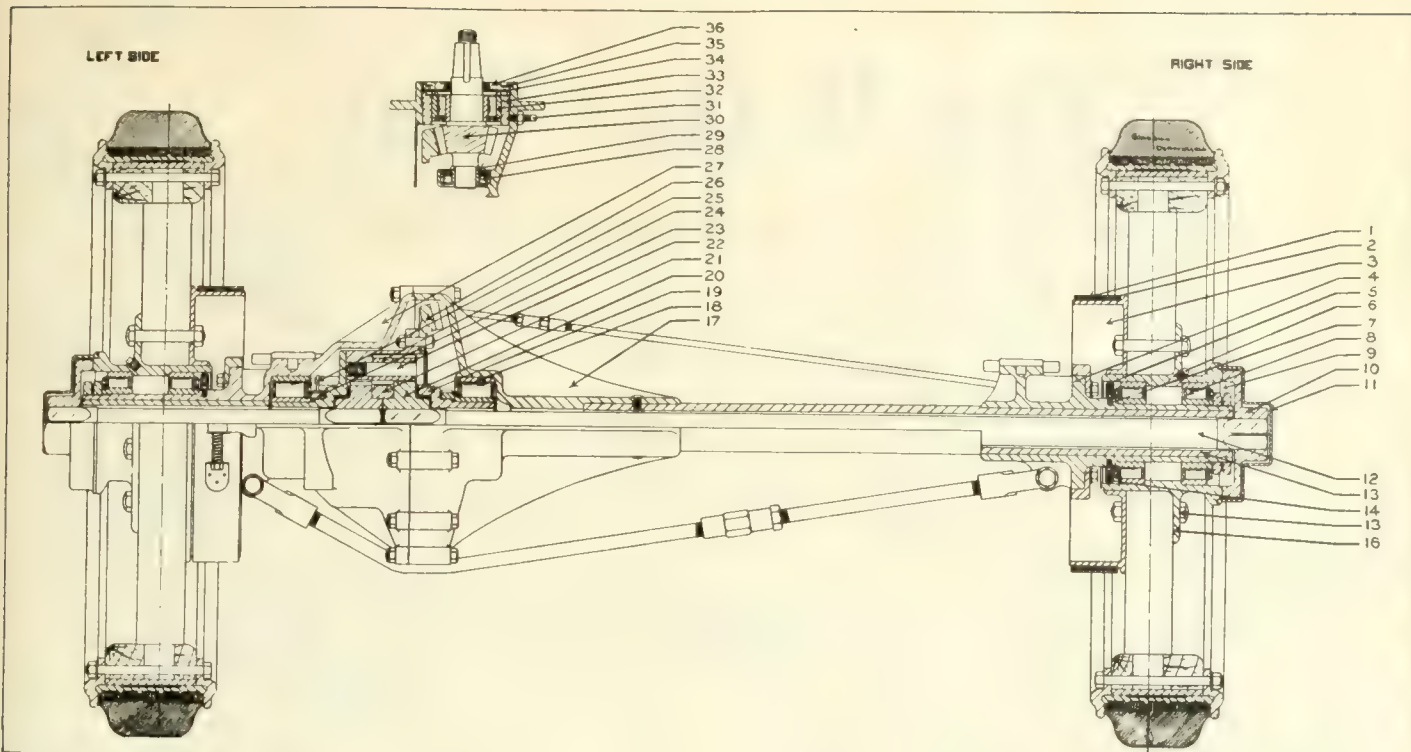
The emergency brake is of the contracting band type, equalizing linkage being used to distribute the braking force to the brake drums equally.

In relining the emergency brakes, proceed as follows:

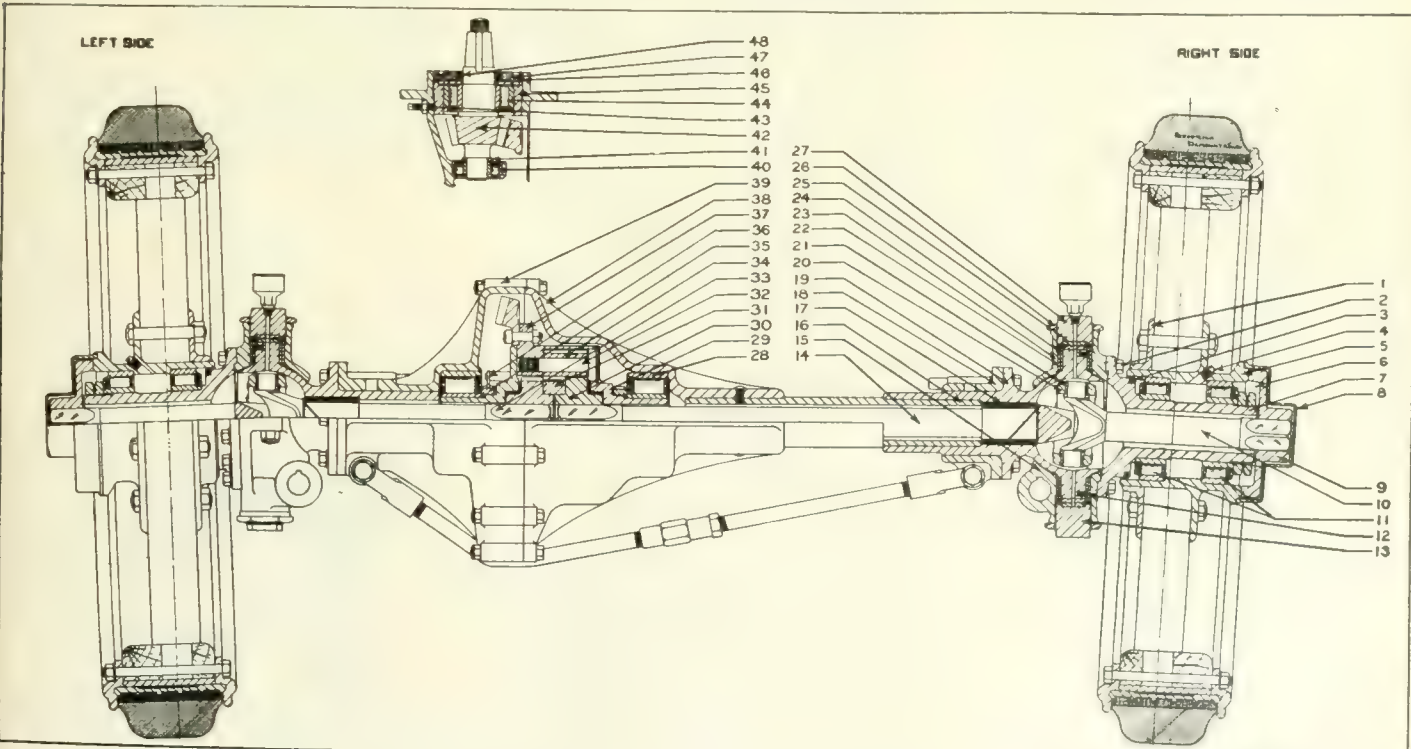
1—First remove the hub cap, then the skein nuts, and the two skein lock washers, large and small. Then remove the wheel; it may be necessary to use a wheel puller or drive the wheel off with an iron bar.

2—Remove the cotter pin and  $\frac{3}{8}$ -in. cast nut from the  $\frac{3}{8}$  by  $\frac{1}{4}$ -in. S. A. E.





- |                           |                                  |  |  |
|---------------------------|----------------------------------|--|--|
| 1. Brake band.            | 10. Driving spider.              | 19. Differential retainer.               | 28. Differential inner thrust bearing. |
| 2. Brake lining.          | 11. Hub cap.                     | 20. Differential spur gear.              | 29. Pinion shim.                       |
| 3. Brake drum.            | 12. Axle shaft, right.           | 21. Differential gear case.              | 30. Pinion shaft.                      |
| 4. Skein and spring seat. | 13. Axle tube.                   | 22. Differential retainer bolt.          | 31. Bearing bushing lock stud.         |
| 5. Skein felt washer.     | 14. Dust ring.                   | 23. Differential retainer adjusting nut. | 32. Differential outer bearing.        |
| 6. Hub grease plug.       | 15. Hub bolt.                    | 24. Differential spur gear.              | 33. Bearing bushing.                   |
| 7. Dust ring set screw.   | 16. Hub.                         | 25. Differential lock dog.               | 34. Bearing bushing steel washer.      |
| 8. Hub roller bearing.    | 17. Differential housing, right. | 26. Differential bevel gear.             | 35. Bearing bushing lock nut.          |
| 9. Hexagon skein nuts.    | 18. Differential main bearing.   | 27. Differential housing, left.          | 36. Pinion felt washer.                |



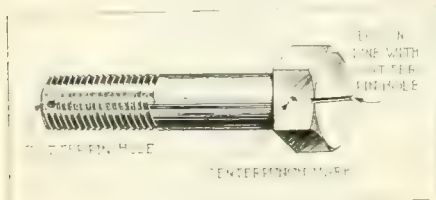
- |                                       |  |   |  |
|---------------------------------------|--|---|--|
| 1. Hub flange.                        | 13. Socket plug, bottom.                         | 24. Ball bushing.                               | 36. Differential lock dog.             |
| 2. Skein bolts.                       | 14. Front axle shaft, inside member, right hand. | 25. Socket plug bottom.                         | 37. Differential gear case.            |
| 3. Skein felt washer.                 | 15. Socket member, bottom half, right.           | 26. Socket plug lock nut.                       | 38. Differential housing, right.       |
| 4. Hub grease plug.                   | 16. Axle tube.                                   | 27. Socket plug, top.                           | 39. Differential housing, left.        |
| 5. Hub.                               | 17. Axle shaft bronze bushing.                   | 28. Differential main bearing.                  | 40. Differential inner thrust bearing. |
| 6. Hexagon skein nuts.                | 18. Spring seat.                                 | 29. Differential case retainer.                 | 41. Pinion shim.                       |
| 7. Skein.                             | 19. Right hand ball.                             | 30. Differential spur gear.                     | 42. Pinion shaft.                      |
| 8. Hub cap.                           | 20. Cage ring.                                   | 31. Differential gear case.                     | 43. Bearing bushing lock stud.         |
| 9. Driving spider.                    | 21. Cage ring bushing.                           | 32. Differential retainer bolt.                 | 44. Differential outer bearing.        |
| 10. Front axle shaft, outside member. | 22. Socket bushing.                              | 33. Front axle shaft, inside member, left hand. | 45. Bearing bushing.                   |
| 11. Hub roller bearings.              | 23. Socket member, top half, right.              | 34. Differential spur pinion.                   | 46. Bearing bushing steel washer.      |
| 12. Blind set screw.                  |  | 35. Differential retainer adjusting nut.        | 47. Bearing bushing lock nut.          |
|                                       |  |   | 48. Pinion felt washer.                |

# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 413—To Find That Cotter Pin Hole

WHEN working on inaccessible parts of the truck, such as assembly or disassembly work on the universal joints, gearset case, etc., there are few mechanics who have not had the exasperating experience of fumbling blindly to find the cotter pin hole on a bolt, the head of which can be seen but the end of which cannot. In a case of this sort, especially where dirt has got into the pin hole and made it level with the bolt, a mechanic may scratch his fingers and exhaust his temper for some



No. 413—Parallel Slot

time to no purpose. The accompanying illustration shows a simple way to mark the head of the bolt so that the mechanic will have no difficulty in locating the direction of the cotter pin hole. Set the bolt horizontally in a vise with the cotter pin hole vertical and then with a center punch make a mark on the head of the bolt at the side, corresponding to the cotter pin hole. Then set the bolt vertically in the vise and cut a slot across the head of the bolt from the punch

**T**O help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

mark to the opposite side with a hacksaw. This slot will be parallel with the cotter pin hole and will always indicate the direction of the latter. The slot thus cut will also be useful as a screw driver slot.—R. L. BROWN, West Orange, N. J.

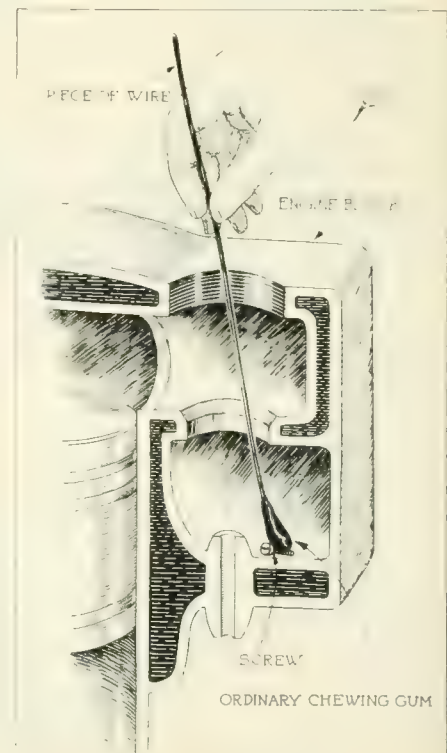
## No. 414—Valve Repair for Blow Torch

ANY mechanic or repair man who has had experience with a blow torch has probably suffered from the annoyance of having the pump fail and wear out just when the torch is most needed. This means time wasted until a new torch can be procured, to say nothing of the expense of the new torch. In the accompanying illustration is shown a method by which the torch having a worn-out pump can be very rapidly repaired and the cost of a new one saved to the company. To repair the torch in this way, simply remove the old pump and solder into the pump opening in the top of the torch an old inner tube tire valve. The soldering should be carefully done so that the job is air-tight. When this is completed the torch can be pumped up with an ordinary tire pump, or, more conveniently, with an air line that has a good

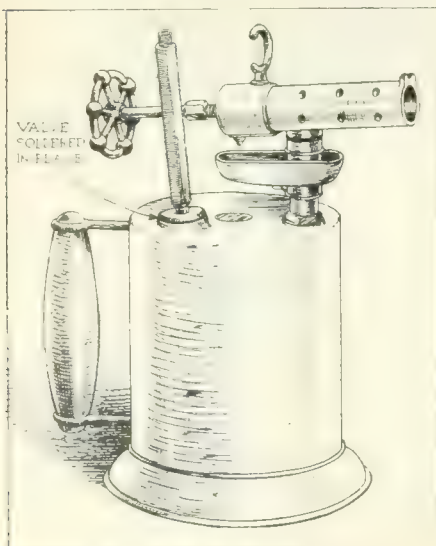
pressure, and the blow torch is again ready for use and as good as new.—C. J. WALKER, Lucama, N. C.

## No. 415—When Small Parts Drop Into Inaccessible Places

SOMETIMES a small screw or nut or other small metal part will slip out of the hand and drop down into some inaccessible part of the engine or gearset. In cases of this sort it is sometimes very difficult to retrieve them and much time and effort is wasted in this way. Here is another method of picking up such small parts. Ordinary chewing gum can be had practically anywhere. Simply chew up a piece of gum until it is sticky and then attach it to the end of a small stick or rod. The rod or stick may then be inserted into the spark plug hole or wherever the nut or screw happens to be. If the gum is pressed against the small part it will stick to it and the part may be lifted out in this way. This method will often be found more convenient than either wire, pliers, or a magnet. The latter is, of course, of no use if the part happens to be of brass.—WALTER F. DAASCH, Davenport, Iowa.

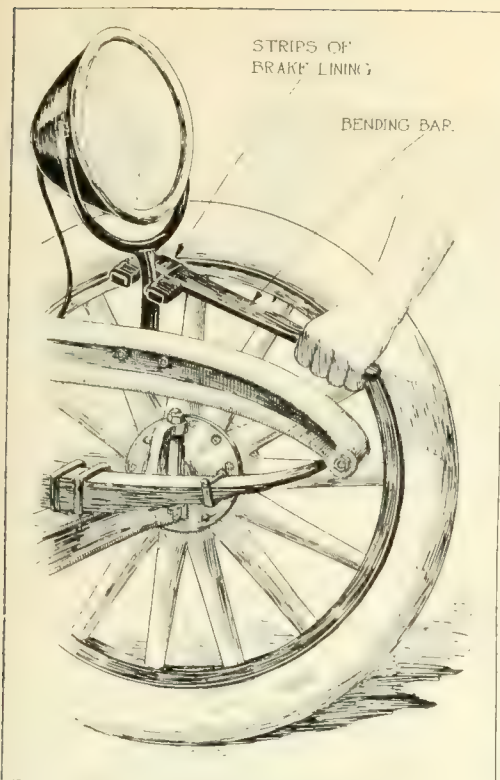


No. 415—Lost Screw

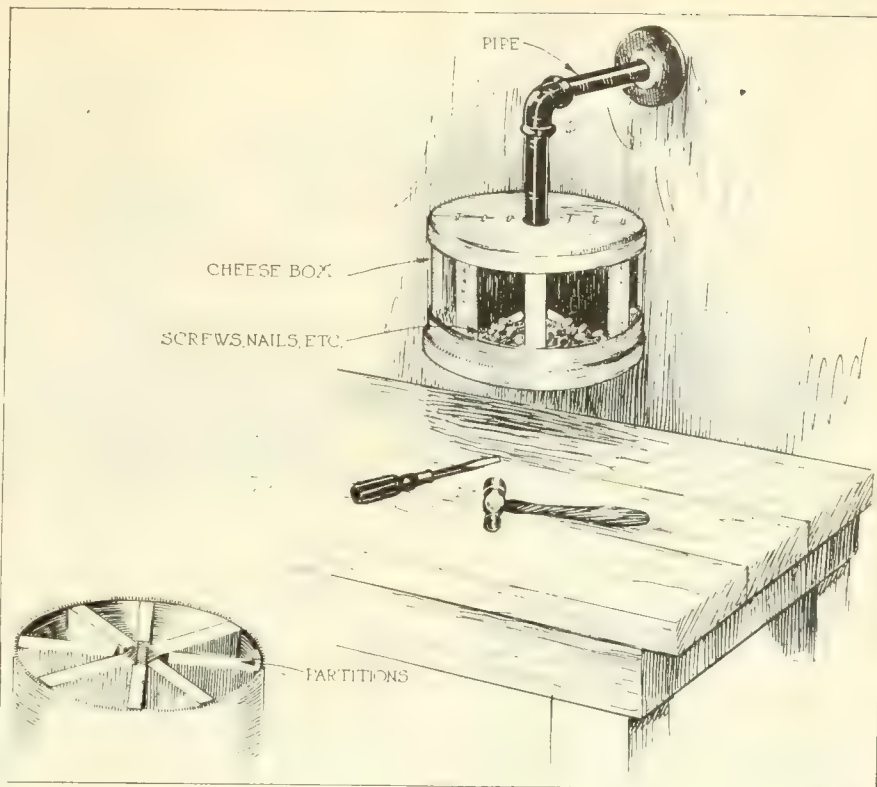


No. 414—Repairing Torch





No. 416—Paint Protectors



No. 417—Stand for Small Parts

### No. 416—Paint Protectors on Bending Tool

IN spite of careful driving, there will always be a certain percentage of slight accidents and collisions in handling trucks, resulting in bent fenders, lamp brackets, bumpers, etc. When the damage is not serious the part can usually be restored to its previous condition and position by bending it straight with a wrench or bending rod, as shown in the accompanying illustration. However, if a wrench or bending rod is applied directly to a lamp bracket, for example, the force required to straighten it will chip and mar the paint, and protecting the jaws of the bending tool with an old piece of cloth or waste is unreliable and apt to be unsatisfactory. This marring of paint work may be avoided, however, by the method suggested in the illustration. Strips of old brake lining are tied or sewn securely around the jaws and the back of the bending tool. This will prevent scratching plated or enameled levers, pedals, headlight rods, brackets, etc.—DONALD McCLEAN, Cleveland.

### No. 417—Revolving Stand Handy for Small Parts

HERE is another useful little device in which to keep small parts handy for the mechanics at the repair bench. The device is a little bin made from an old cheese box. The interior of the bin is partitioned off into six or eight sections to hold small screws, bolts, nuts, washers, cotter pins, etc. The partitions may be very easily made from small sections of wood and glued or nailed in place with small nails. When the parti-

tions are in place, the outside of the circular box is cut away, to give access to the partitions through the side. The lid of the box is bored through for the pipe and flange on which it hangs, and is then nailed down to the rest of the box. The pipe support is in the form of an elbow with a flange at each end, one of which is nailed to the wall.—CHARLES H. WILLEY, Concord, N. H.

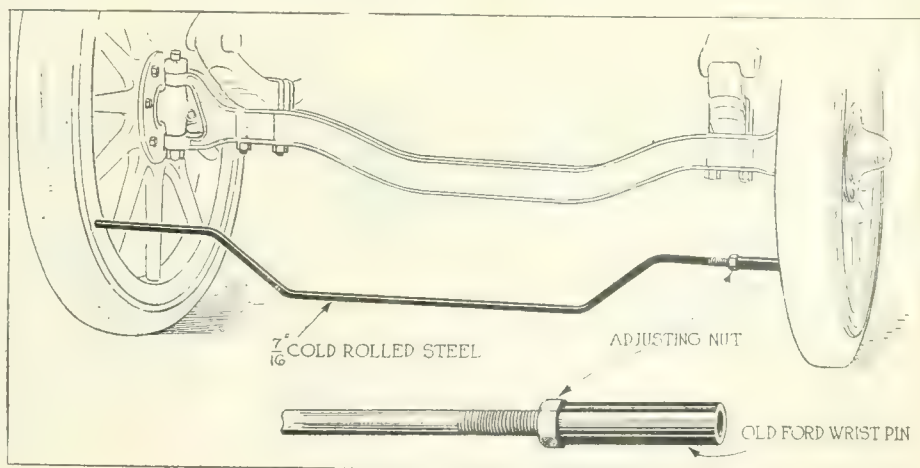
### No. 418—Front Wheel Gage Made in the Shop

HERE is another method of constructing a home-made gage for testing the alignment on the front wheels. The gage is made of  $\frac{7}{16}$  in. cold rolled steel and is nearly as long as the width of the tread on the average truck. One end of this rod is threaded as far back as may be necessary and an adjusting

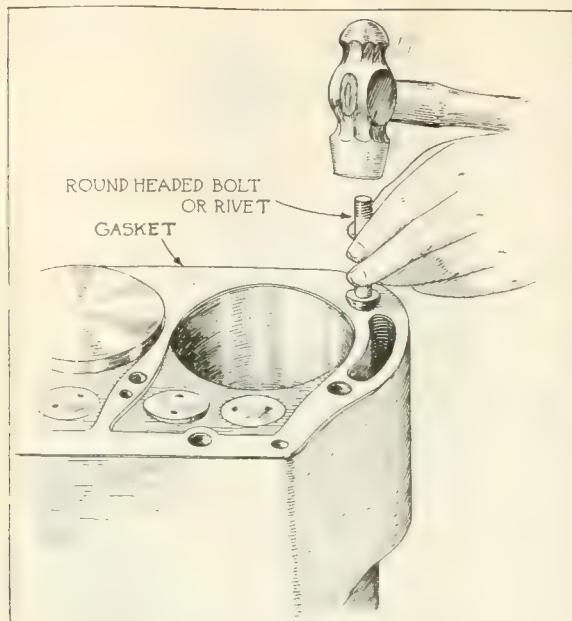
nut is run onto this threaded part. An old Ford wristpin is then slipped over the threaded end and up to the nut, as shown. Screwing up the nut will then adjust the device so as to hold the wristpin against the inside of the felloe. The importance of a close watch on possible front wheel misalignment cannot be overestimated because of the resulting wear on the tires. Therefore, if a standard wheel aligner is not available this device will prove highly valuable.—H. MARSDEN, Detroit, Mich.

### No. 419—Old Piston Used As Melting Ladle

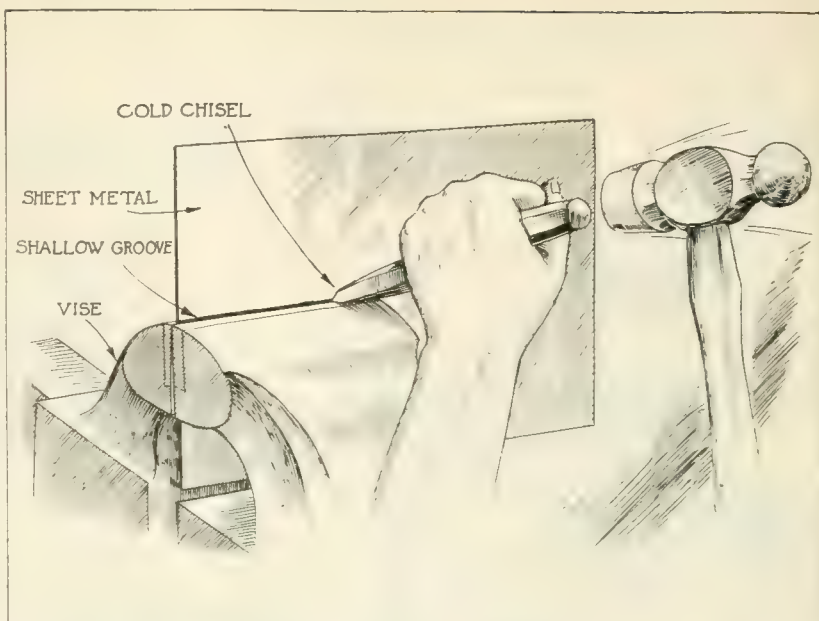
THERE are many occasions in a repair shop during repairs on the trucks themselves as well as repairs or adaptations of tools and equipment, where a melting ladle is required. If such a ladle



No. 418—Front Wheel Gage



No. 420—Cutting Gaskets



No. 421—Cutting Sheet Metal

is not available, a satisfactory substitute may be constructed out of an old piston which has been discarded. One of the wrist pin bosses is plugged with metal or clay and the other has a round bar welded into it to serve as a handle. For greater convenience in handling the ladle, the handle may be bent twice in the manner indicated in the accompanying illustration. As the welded connection is metal to metal, the handle may become too hot to hold conveniently. In this case the iron bar can be wrapped with cloth or rubber, or can be fitted with a wooden handle outside the metal to protect the hands. This will be found a convenient ladle, as it will pour readily and it has the advantage of costing nothing to construct.—ARTHUR CHURCH, Alexandria, Neb.

### No. 420—For Cutting Holes in Engine Gaskets

IT is sometimes necessary in shop practice, when applying a new gasket between the engine block and the cylinder head, to cut out the holes for the bolts and for the water circulating system. If the operator attempts to do this with a

knife, the edges of the holes will probably be very irregular. The same purpose may be accomplished, however, by the method indicated in the accompanying illustration. Simply place the gasket in position, first painting it with shellac so that it will stick to the cylinder block.



No. 419—Ladle

Then take a round-headed bolt or rivet and a hammer and drive the round head of the bolt down onto the gasket above the holes. By this method the gasket is

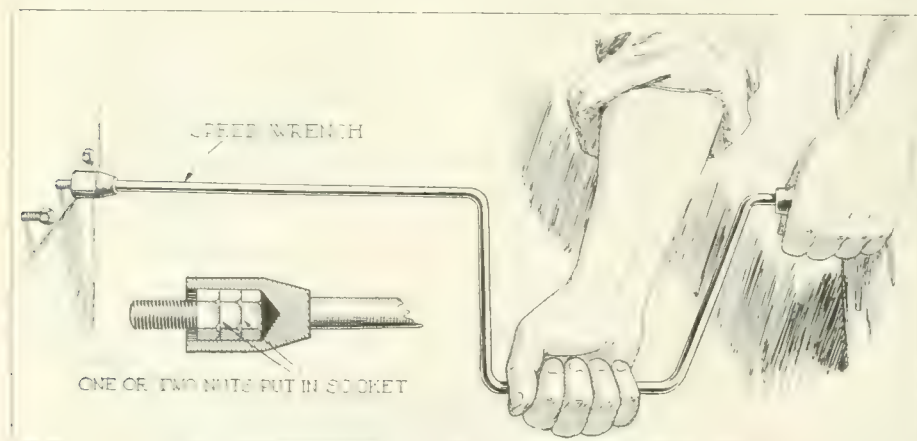
cut out by the sharp edges of the holes themselves, so that the hole cut is an accurate reproduction of the hole in the engine block and is exactly concentric with it. Care should be taken to remove all the fragments from the cylinder block before the cylinder head is put on again.—M. S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

### No. 421—Easy Method to Cut Sheet Metal

HERE is a suggestion which may prove useful at any time in shop practice, for example, when it is necessary to mend or patch a fender or some part of a refrigerator or other body, especially if the sheet metal to be cut is too thick to be cut with shears, or if shears are not available. Place the sheet metal in a vise so that the line to be cut is exactly even with the top of the vise jaw. Then with a chisel, hammer a shallow groove along the top of the vise jaws. When the sheet metal is removed from the vise it will be found that it can easily be broken along the line of the groove. Even metal up to  $\frac{1}{4}$  in. thick can be grooved and broken in this manner. The method is only of use, however, when the line to be cut is straight.—M. S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

### No. 422—Nuts Used as Shims on Socket Speed Wrench

ON certain types of speed wrenches the sockets are so deep that when an attempt is made to screw in a short screw, the latter will sink all the way into the socket and it is impossible to insert the screw into the surface into which it is to be driven. A remedy for this is to place one, two or even three nuts of the same size as the interior diameter of the socket in the socket, where they will act as shims and keep the head of the



No. 422—Nuts Used as Shims



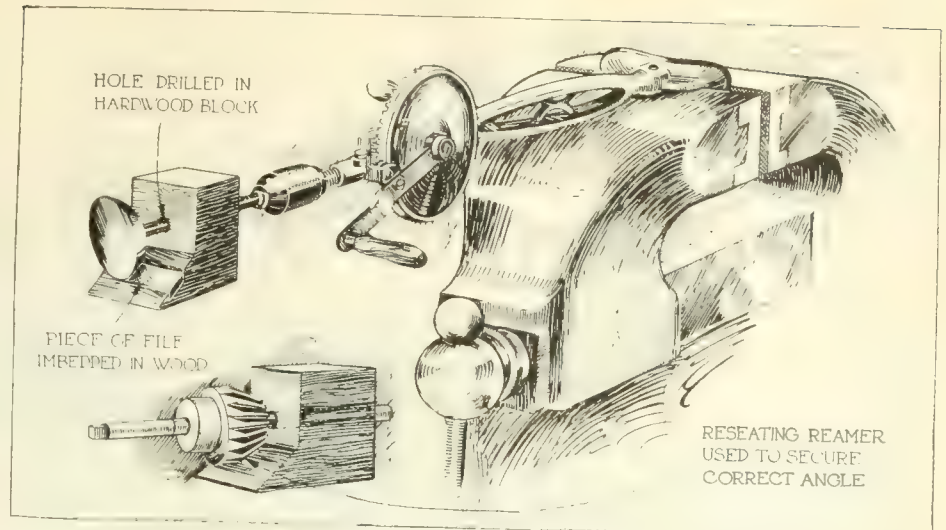
screw near the end of the socket, so that the point of the screw projects sufficiently to be inserted in the required surface. If nuts of the correct size are not available, the heads may be sawed off a couple of screws of the same size and these will serve equally well as shims.—W. B. WHEATLEY, Brooklyn, N. Y.

### No. 423—Breast Drill as Valve Facing Tool

THE accompanying illustration shows how a breast drill may be used to grind a face on a valve at the correct angle. The breast drill is placed in a vise. A block of wood with a flange, as shown, is bored for the valve stem, the correct angle on the flange being obtained by means of a reseating reamer inserted in the hole bored for the valve stem and used as a gage. A section of straight flat file is then inset in the shoulder of the wooden block so that its surface is flush with the surface of the flange. As the illustration shows, the valve stem is then passed through the hole in the wooden block and inserted in the chuck of the breast drill which is held fast in the vise. Pulling the block outward, away from the drill, will then face the valve satisfactorily. The block should be of hard wood to prevent the slight distortion possible with soft wood, which would not insure a correct angle to the face of the valve.—N. C. MORSE, New Bedford, Mass.

### No. 424—Bench Device for Deflating Tubes

IN most modern truck garages a department is set aside for the care and repair of the truck tires and tubes. The device shown in the accompanying illustration will prove a valuable addition to such a department. When it is desired to roll up a tube either to put it away or to pack it in a bag for carrying on the truck as a spare, it is necessary entirely to



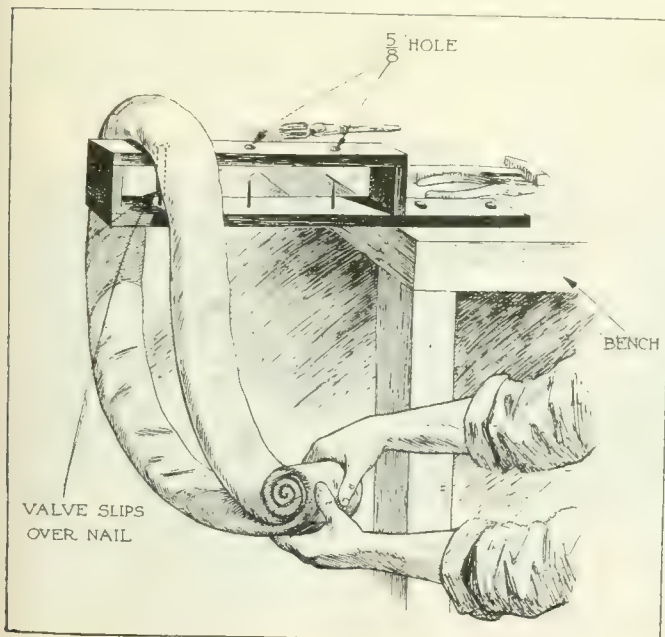
No. 423—Valve Facing Tool

deflate the tube while rolling it up. This is awkward and difficult for one man because the valve must be held open while rolling up the tire. The device shown consists of a long board fastened to the bench and having three nails driven up through it so that their points project upward. Another board is placed above these, resting on two short supports as shown. This upper board has three  $\frac{5}{8}$  in. holes bored in it directly above the points of the nails. When it is desired to deflate the tube the valve stem is passed through one of the holes at the top of the fixture and the projecting nail below this hole opens the valve. Then as the tube is rolled up, the air is forced out through the valve thus held open.—ZEELAND BATTERY & TIRE SHOP, Zeeland, Mich.

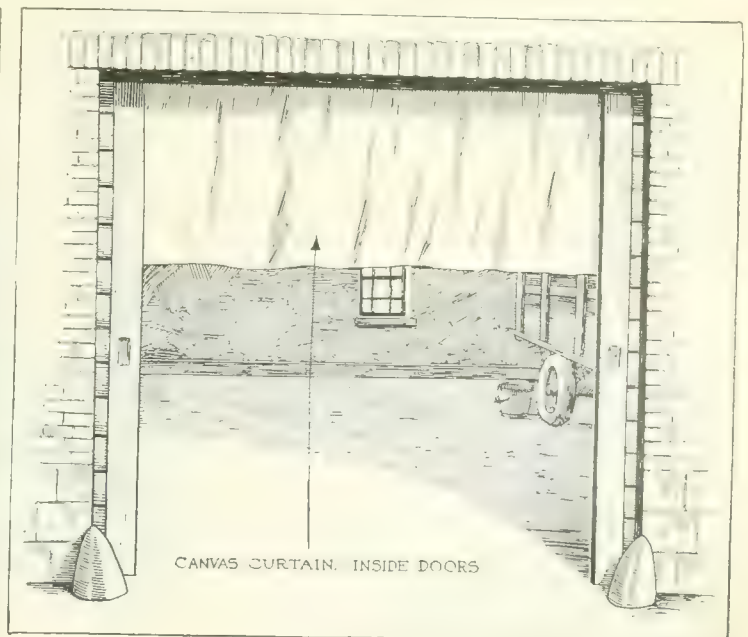
### No. 425—Curtain Keeps Warm Air in Garage

IN very cold weather it is very difficult to keep even a well-heated garage at a uniform and sufficiently warm temperature, owing to the necessity of open-

ing the wide garage doors at frequent intervals to permit the exit or entrance of one of the vehicles. This is especially true because, as a rule, the garage doors open nearly to the ceiling or roof, and this permits the warmer air in the upper part of the garage to pass out and to be replaced by cold air through the lower part of the door. This state of affairs results in discomfort for the mechanics, inefficient work due to cold, stiff fingers and even possible illness. The accompanying illustration shows a device especially designed to prevent the escape of the warmer air, which naturally rises to the upper part of the garage. The device consists of a canvas curtain stretched across the doorway and hanging from above it. It is not essential that the curtain should be high enough to allow head room for the trucks, as, if it is not hung too low, the truck bodies will brush it aside without injury either to the truck or to the curtain. The curtain will help greatly in reducing the heat loss when the doors are opened in winter.—L. B. SCHUYLER, Auto Supply Co., Lock Haven, Pa.



No. 424—Deflating Tube



No. 425—To Keep Garage Warm



# 1 1/2-Ton Waltham Built for Quick Deliveries

**Equipped with Pneumatic Tires  
Assembled with Standard Units**

## Waltham Specifications

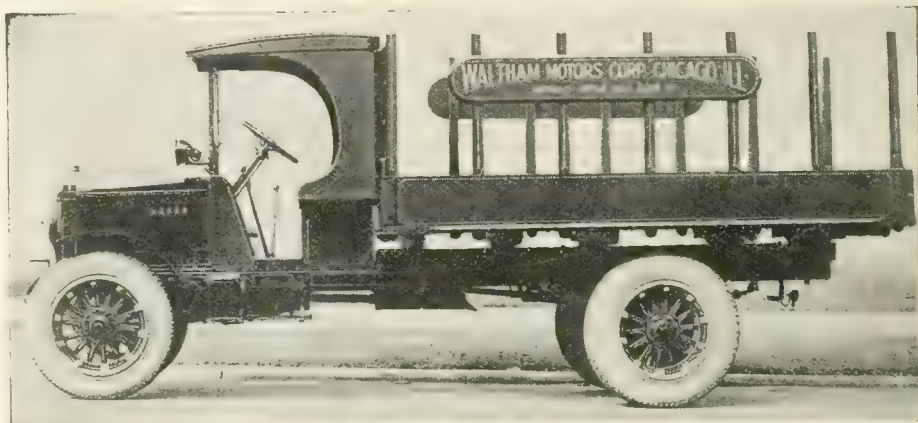
Capacity, tons	1 1/2
Price	\$2,500
Wheelbase, in.	140
Tires, front	36 x 6
Tires, rear	38 x 7
Bore, in.	3 3/4
Stroke, in.	5 1/4
N. A. C. C. hp.	22.5
Speed, r.p.m.	1200
Speed, m.p.h.	20
Gear ratio in high gear	7.75
Final drive	Worm

**T**HE Waltham Motors Corp., Chicago, is marketing a 1 1/2-ton worm-driven truck. This company was organized early in 1920 to purchase all of the interests of the Victor Motor Truck and Trailer Co., the Victor truck being discontinued and the newly designed Waltham taking its place.

This new truck, which is equipped with pneumatics and electric lighting, has been designed to meet the requirements of the retailer and merchant who wants quick deliveries in the city and suburban districts, and for the manufacturer and wholesaler who wants a light truck as an auxiliary to heavier models.

The price, equipment, speed, method of lubrication of all moving parts, ease of repair and adjustment are selling arguments featuring this new truck. The standard length of the chassis will take a 12 by 6-ft. body.

Well known units are used in the assembly of the Waltham. These units include a Buda four-cylinder engine; Zenith carburetor; Apollo high-tension magneto; Pierce governor; Castle pressed steel frame; Chicago finned tube radiator



*The new 1 1/2-ton worm-driven Waltham*

with cast case; Fuller clutch and three-speed gearset; Detroit Pressed Steel springs; Sheldon front and rear axles; Spicer universal joints; and Ross steering gear.

Fuel is fed by gravity from an 18-gal. tank located under the seat. Lubrication of the engine is taken care of by a full forced feed type of oil system. The pump which is of the geared type, is located in the base of the oil reservoir, entirely submerged in oil. It is driven by a vertical shaft in connection with the camshaft, and is easily detached from the outside for cleaning or inspection, from the bottom of the oil pan, by removing six cap screws. The oil is drawn from the lower oil reservoir through a fine mesh screen and discharged by a steel distributing tube located horizontally the full length of the crankcase into connecting passages which carry the oil

directly to each camshaft bearing and main crankshaft bearings. From the crankshaft main bearings the oil is forced through the drilled crankshaft to each connecting rod bearing; from the connecting rod bearings the oil is forced through a small tube up the connecting rods to the piston pins. Cylinder walls, cams and pistons are lubricated by oil thrown from the lower ends of the connecting rods, caught by the piston and carried up into the cylinder.

Drive is taken from the gearset through a two-piece, three-joint shaft. A center bearing is used to prevent whipping of the shaft. The semi-elliptic springs are of the Hotchkiss drive type. They are of alloy steel and bronze bushed.

The weight of the chassis is 3,800 lb. Regular equipment includes a driver's cab, two side and one tail light, tool box, tools, jack, and horn.

## International 3/4-Tonner Has Speed of 30 M. P. H.

### International Specifications

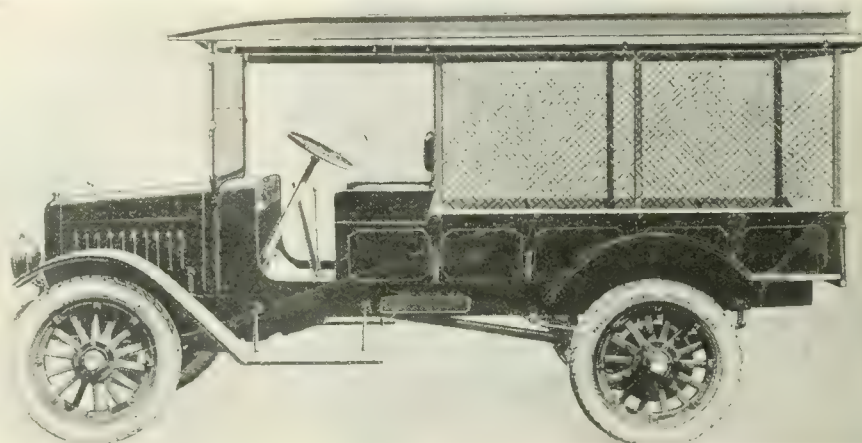
Capacity, tons	3/4
Price	\$1,500
Wheelbase, in.	124
Tires, front	34 x 5
Tires, rear	34 x 5
Bore, in.	3 1/2
Stroke, in.	5
N. A. C. C. hp.	19.6
Speed, m.p.h.	30
Speed, r.p.m.	1,500
Gear ratio in high gear	6.3
Final Drive	Int. gear

**A** NEW 3/4-ton internal gear-driven speed truck priced at \$1500 is in production at the Springfield, Ohio, plant of the International Harvester Co. This model has a speed of from 25 to 30 m.p.h. and is equipped with a Lycoming four-cylinder block-cast, L-head engine.

The engine is lubricated by a pump and splash system. Cooling is taken care of by a thermo-siphon system in conjunction with a Long fin tube type of radiator. Fuel is fed to the Ensign carburetor by vacuum from a 12-gal. tank located in the cowl. Ignition is by a Connecticut distributor mounted on the engine.

Regular equipment includes pneumatic cord tires, demountable rims, electric lighting and starting, two headlights (bright and dim) and tail lamp, front fenders, electric horn and tools. Special

equipment supplied from the factory at extra cost includes an open express body, cab top, full-length top, screens for full-length top, speedometer, spare rims and tires.



*The new 3/4-ton International speed truck*



The clutch and gearset are of Muncie design, the clutch being of the multiple dry-disk type and the latter of the selective, three-speed, unit with the motor type. Both propulsion and driving torque are taken through the half-elliptic Standard Steel springs. The rear springs are 2½ in. wide and 54 in. long. The front springs are 2¼ in. wide and

38 in. long. The rear auxiliary springs are 2¼ in. wide and 24 in. long.

The Torbensen internal-gear axle has a heat-treated drop-forging for carrying the load with a live axle for transmitting the power. The front axle is of I-beam construction.

The Parish & Bingham frame is of pressed steel material and semi-flexible

construction and is made of 5-in. channels. Both brakes operate on drums on the rear wheel; the service brake contracting and the emergency expanding. Artillery type of wheels are regular equipment.

The steering gear is of C. A. S. design and is mounted on the left with brake and gearshift control in the center.

## Six Super-Truck Models Now in Production

Special Attention Has Been Paid to Lubrication and Facilitating Repairs

### SUPER-TRUCK SPECIFICATIONS

Capacity, tons	2½	3½	5
Price	\$3,300	\$4,300	\$5,300
Wheelbase, in.	156	164	164
Tires, front	36x4	36x5	36x5
Tires, rear	36x8	40x5d	40x12
Bore, in.	4	4¼	4¾
Stroke, in.	6	6	6
N. A. C. C. hp.	25.6	29	36.15
Speed, r.p.m.	1100	1100	1000
Speed, m.p.h.	13½	11	11
Gear ratio in high gear	8.75	10.25	10.25
Final drive	Worm	Worm	Worm

THE O'Connell Motor Truck Co., Waukegan, Ill., is now producing six super-truck models. These include 1½-, 2-, 2½-, 3½-, 5- and 7½-ton sizes, all assembled from well-known units. With the exception of size, all of the models are similar in most cases in appearance and construction.

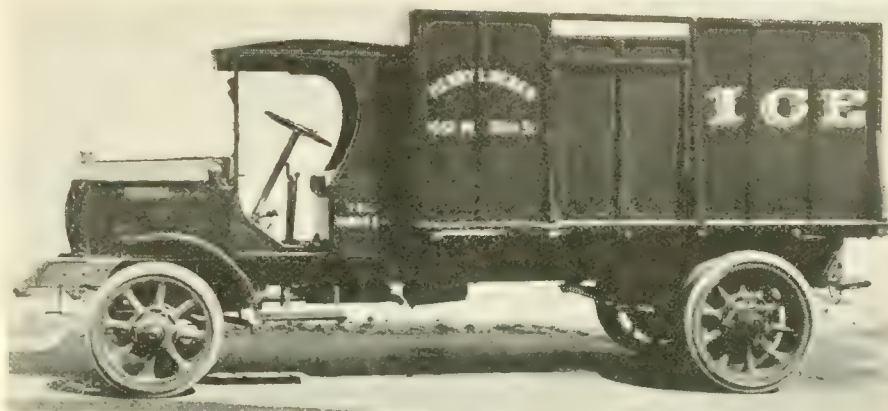
A feature of the 3½-, 5- and 7½-ton models is the large oil pocket in the shackle. The steel lid at the opening of the pocket is held in position by a snap spring, making a practically fool-proof device, which is very satisfactory for dump trucks, where the rear end is continually being jammed into piles of coal, crushed stones, etc.

Super-Truck models are assembled with the following units: Wisconsin four-cylinder engine, Sheldon worm-driven axle, Smith metal and Prudden wood wheels, Zenith carbureter, Bosch magneto, Chicago radiator, Ross and Lavine steering gears, Sheldon all-alloy steel springs, Fuller clutch and gearsets, and Spicer and Thermoid-Hardy driveshafts and universal joints.

The brake pins are hardened glass hard and the brake yokes are of a very tough steel, drop-forged. The balls and sockets of the steering gear and spark and throttle control rods are also hardened.



Note the large oil pocket in the spring shackle



One of the Super-Truck models built by the O'Connell Motor Truck Co.

The front cross-member of the frame is removable and allows for complete renewal of all timing gears, as well as the removal of the camshaft without taking out the engine. The bolts used in the frame are of 3½ per cent nickel steel and heat-treated to give maximum strength and furnished oversize to insure a tight drive in the holes of the frame and castings.

The castings which form all the essential chassis brackets are of low-carbon electric steel and are annealed to stand a pull of from 73,000 to 100,000 lb. per sq. in. of metal.

Special attention has been paid to the lubrication of the complete job and practically all oil cups have been brought out where they can be attended to without getting under the truck.

By means of a steering arm or lever made to special requirements it is possible to cut the front wheels to a large angle either right or left. As a result, the trucks turn in a very short radius or space.

The gasoline tanks are of round construction and both the brackets and the straps are lined with a heavy wide webbing of the nature of canvas belting in order to prevent them from coming in contact with the fastenings and wearing holes through them.

Runningboards are of maple faced with steel. As far as possible, the nuts instead of the heads of the bolts have been put on the outside of the frame so that the repairs may be made as easy as possible.

Equipment includes electric lighting, a set of small tools, oil can, and an oil pressure gage mounted on the dash.

### New 1½-Ton Yale Completely Equipped

THE Yale Motor Truck Co., New Haven, Conn., has entered the truck field with a 1½-ton worm-driven model, assembled with standard units. The price, which is \$2800, includes an express body with a fixed top. Equipment includes a two-piece windshield, Westinghouse electric starting, lighting and ignition, Willard battery, bumper, electric horn, Kellogg motor driven air pump, spotlight, jack, complete set of tools, one spare rim, and radiator guard.

The truck assembly includes such units as a Herschell-Spillman 3½ by 5-in. four-cylinder engine, developing 19.6 hp.; Stromberg carbureter; Borg & Beck clutch; Cotta three-speed gearset which is a unit with the engine; Shuler front and Empire rear axles; Spring Perch half-elliptic springs; Ross steering gear; and Snead universal joints. The frame and wooden wheels are made at the Yale factory. The frame is of 5-in. steel channel.

The wheelbase is 132 in. Hotchkiss drive is employed, both propulsion and driving torque being taken through the springs. Both brakes are internal-expanding on the rear wheel drums. The wheels are mounted with 35 by 5-in. pneumatic tires.

The cylinders are cast in block with the valves in the head. Water is circulated by thermo-syphon through a vertical finned tube type of radiator with a cast iron case. Fuel is fed by gravity from a tank located under the seat. The engine is lubricated by an oil pump and splash system.



# Shop Equipment

*Time and Money Saved  
in Truck Repairs*

## Weston Battery Tester

THE Weston heavy discharge battery tester consists of a well-designed, substantial prod upon which is mounted a direct current voltmeter having a range of 3-0-3 volts. The prod has a wood handle, and the points are so spaced that they fit the cell terminals of the standard automotive battery. The prods are connected by an alloy strip which passes about 200 amp. when the cell voltage is 2. It is known as Model 453. Price, complete, \$18; prod only, \$8.50. Weston Electrical Instrument Co., Newark, N. J.

## Reed Portable Lathe

THE Reed portable 14-in. motor-driven lathe will be found convenient where there is much turning and fitting to be done in the assembling of large mechanisms that are too bulky to move to the lathe locations. It contains a quick change gear mechanism, the gears in the front case being made of steel, of cut coarse pitch. The actual swing is 16 in.

The lathe is mounted on heavy wheel legs, and can easily be drawn from one job to another. It is made with either compound, elevating or plain rest. The rest screws have micrometer dials. A taper attachment can be supplied with either style of rest.

The lathe is made only with a 1 hp., 115 or 230 volt, alternating or direct current, shunt wound, variable speed motor, with the full reversing drum type of controller, and usual resistance. The controller is fitted with the Reed patented speed regulating device which enables the operator to obtain any predetermined speed instantly without calculation. The entire control, starting, stopping and reversing, is effected by means of a handle on the front of the apron at the right-hand side. The price is \$1,850 and the maker is the F. E. Reed Co., Worcester, Mass.

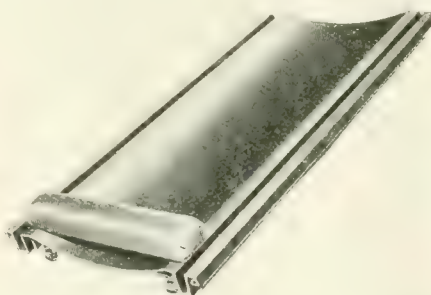


*The Weston battery tester*

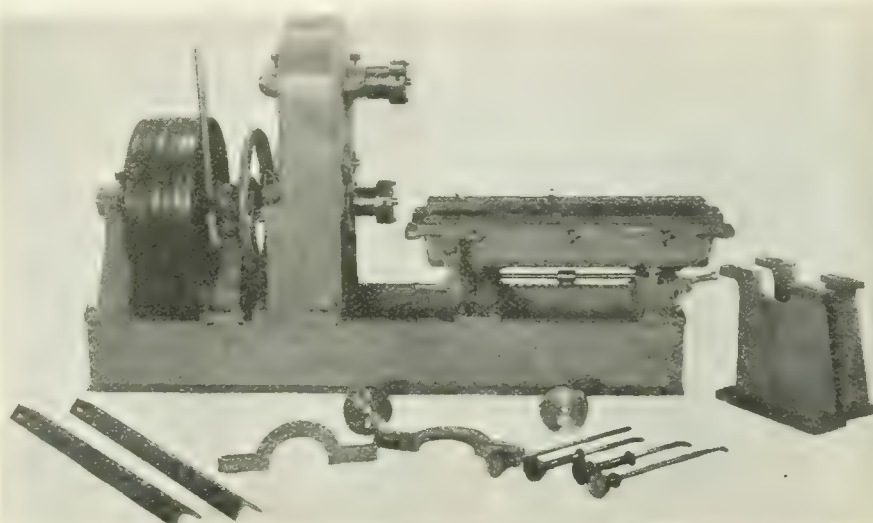
*Weston Battery Tester  
Reed Portable Lathe  
C-O Burning-In Machine  
Badger All-Steel Creeper  
Simplicity Hydraulic Jack  
Wright High-Speed Hoist  
Humboldt Wheel Puller  
Auto Compressor  
B & D Wall Drill*

## C-O Burning-In Machine

SIMPLICITY and flexibility are two features of the new Canedy-Otto burning-in and running-in machine. The table is raised and lowered by a single control. This table is grooved and the engine clamps can be adjusted to the size of the engine. The table also serves



*Badger creeper*



*C-O burning-in machine*

as a sump or crankcase, so that the crankshaft splashes in fresh oil, in every way similar to the actual performance of the engine in operation. The clutch is an extra heavy toggle type, driving through a silent chain. The machine requires a floorspace of only 90 in. over-all. The price is \$635 and the manufacturer is the Canedy-Otto Mfg. Co., Chicago Heights, Ill.

## Badger "All-Steel" Creeper

THE Badger all-steel creeper has been designed for the hardest service and to give the mechanic ease of movement and comfort while working under the truck. The body or the platform is 26-gage sheet steel and properly shaped to conform to the mechanic's body. The tool trays on either side afford a convenient and handy place to keep his tools. The angle irons supporting creeper are 1½ x 1½ in., 3/16 in. thick. The castors are of the pressed steel type 1 in. in diameter and mounted on roller bearings. The head rest is well upholstered with a durable grade of material that can be easily cleaned when it has become soiled. The different parts composing this creeper are riveted and bolted together. The list price is \$7.50 and the maker is the Badger Mfg. Corp., Milwaukee, Wis.

## Simplicity Hydraulic Jack

FLEET owners whose garage space is limited will find a practical use in the portable Simplicity hydraulic jack which has a capacity of 12 tons. This jack is useful in moving trucks around in repair shops. It is mounted upon a miniature truck with a swivel wheel





*Simplicity hydraulic jack*

which turns on its own base. A few strokes of the handle is all that is necessary to raise the jack. The handle is also used for moving the jack about. The range of adjustment is from 8 to 19½ in. The jack requires only 17 by 21 in. of floorspace and weighs 160 lb. The price is \$90. The maker is the Simplicity Products Mfg. Co., Milwaukee, Wis.

### Wright High Speed Hoist

**S**TRENGTH, speed and durability are claimed for the Wright hoist. It operates on the planetary system of gearing. The main driving shaft and pinion is a nickel steel forging. A non-fouling chain guide permits raising or lowering the load by a pull on the chain from any angle. The hoist is made in capacities of from ¼ up to 20 tons. The prices range from \$70 up to \$850. The manufacturer is the Wright Mfg. Co., Lisbon, Ohio.



*Wright hoist*

### Humboldt Wheel Puller

**T**HE Humboldt adjustable wheel puller consists essentially of a malleable iron casting. Adjustable clamps are provided, which prevent stripping of threads. It is finished in black enamel and made in two styles, Nos. 390 and 391. The prices are \$1 and 75 cents, respectively. The maker is the Republic Auto Parts Co., Long Island City, N. Y.



*Humboldt wheel puller*



*Auto compressor*

### Auto Compressor

**T**HE automatic compressor made by the Auto Compressor Co., Wilmington, Ohio, is fully equipped. It has double opposed cylinders, 1½-in. bore and 1-in. stroke, and provides 150 lb. pressure at 1150 r.p.m. The compressor is driven by an electric motor. The tank has a filtering device which removes oil and dirt. The complete line of compressor outfits manufactured by this company includes models for all classes of service.

### B & D Wall Drill

**A** POST or wall drill has been designed especially for the purpose of adapting the Black & Decker portable electric drill for use as a drill press for heavy drilling or precision work. The drill can be detached for portable work in a few seconds.

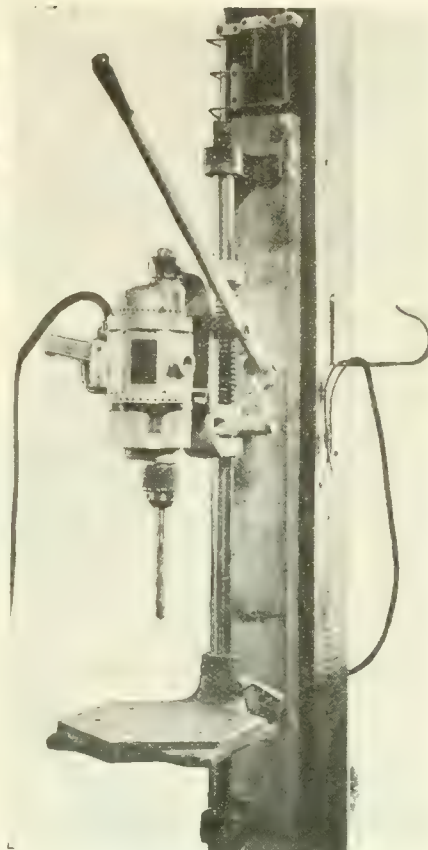
The construction is rigid and all parts are of generous size. The vertical column is a solid steel shaft 1-7/16 in.

in diameter and is clamped to the wall or post by means of heavy brackets.

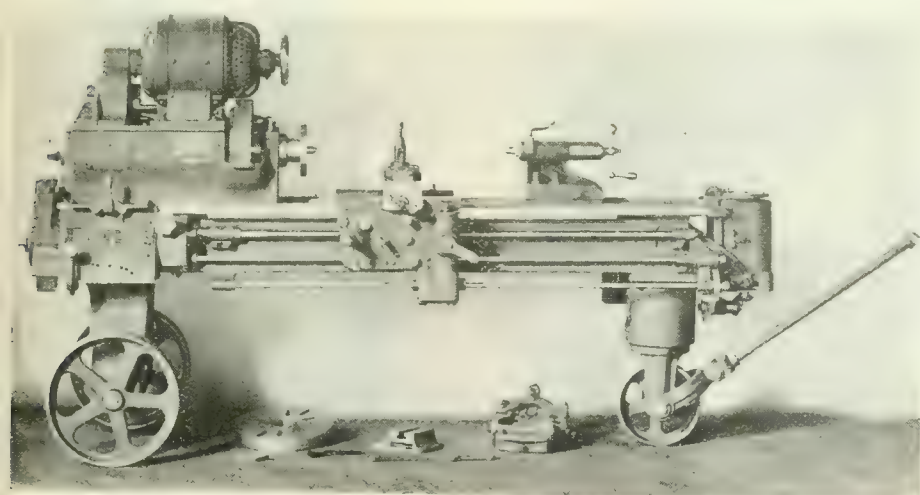
The device takes ¾, ½, 9/16, ⅝ and ⅞-in. B & D drills. The bracket carrying the drill can be raised, lowered or swung around on the vertical column and is secured in any desired position by means of a split collar and clamping screw.

The table can also be raised, etc. Both vertical and horizontal adjustments are secured by means of a clamping screw. An extra long feed lever gives a feed ratio of 6 to 1. One hundred pounds pressure applied to the handle feeds the drill under 600 lb. pressure.

In the table are six tapped holes to accommodate ½-in. stud, used to clamp the work in place. One stud with nut and clamp is supplied with the stand. The maker is the Black & Decker Mfg. Co., Baltimore, Md.



*B & D wall drill*



*Reed portable lathe*

# New Accessories and Parts

*Archer Power Hoist, Toquet Ford Carbureter, Sterling Spring Leaf Oiler, Miracle Blowout Patch, Sprague Ford Steering Gear, Shambaugh Emergency Hub, Peerless Water Circulator, Jiff-On Tire Chains, Midwest Stopshok Wheel, Oscillum Spark Intensifier, Stoppit*

## Archer Power Hoist

THE Archer power hoist for dump trucks connects to the transmission and the power is applied to an I-beam ram through coil chains. Every part is made of steel. The hoist can be locked at any position, even with a full load. The action of the hoist is under the control of the driver at all times through the use of two levers directly in back of the seat. The price of the heavy duty hoists for trucks of 3½ to 7-ton capacity is \$375. The price of the light duty hoist, 1 to 3½-ton capacity, is \$340. These prices include furnishing the take-off so that the hoist can be readily attached to any make of truck.

Archer steel bodies are supported by I-beam bolsters and heavy steel structural sub-frame which extends to the end of the body. Other features include a double-acting tailgate and an automatic latching device. The maker is the Archer Iron Works, Chicago.

## Toquet Ford Carbureter

THE non-adjustable Toquet carbureter for Fords works on a new principle in that the fuel jet is not placed in the main air passage but in a by-pass

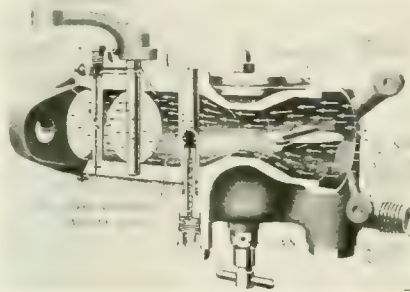
around the throttle valve. The vacuum in this by-pass is governed by fixed openings at either end and varies in degree with the opening and closing of the throttle.

All of the fuel enters the by-pass through the jet. When the throttle is partly closed this fuel passes downward and through the by-pass to the lower hole of the atomizer where it enters the main air passage. At the same time a stream of air enters the perforations and follows the path of the fuel. This mixture of fuel and air drawn at high speed through the small hole of the atomizer,

scatters of itself, but when met by the air blast entering through the top hole of the atomizer it becomes a mist which is instantly absorbed by the warm air passing, thus forming a perfect gas.

This action takes places through all conditions of operation, excepting when the throttle is wide open, which rarely happens; then the fuel enters the main air passage both through the atomizer and through the perforations.

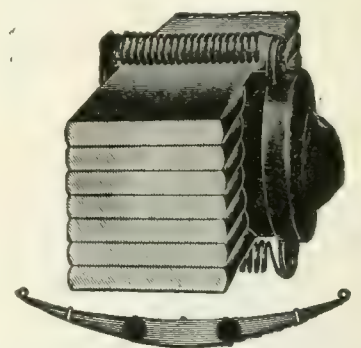
The maker is the Toquet Carbureter Corp., Westport, Conn.



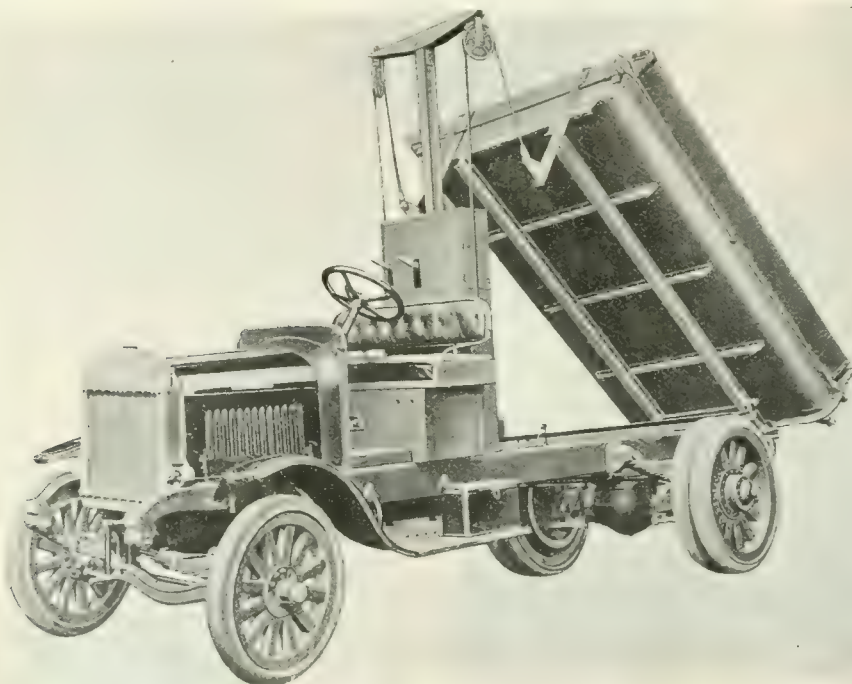
*Toquet Ford carbureter*

## Sterling Spring Leaf Oiler

AUTOMATIC lubrication of the springs is given with the Sterling spring leaf oiler, which is easily attached. No bolts or tools are necessary. The same size fits the springs of all light trucks. The automatic action is based on capillary attraction. The sliding leaves of the spring act like fibers in a wick and draw the oil up or down in the same manner as a wick. The thin film of oil constantly being spread between the leaves supplies just the right kind of lubrication. When the truck stops, the feeding of the oil stops also.



*Sterling spring leaf oiler*

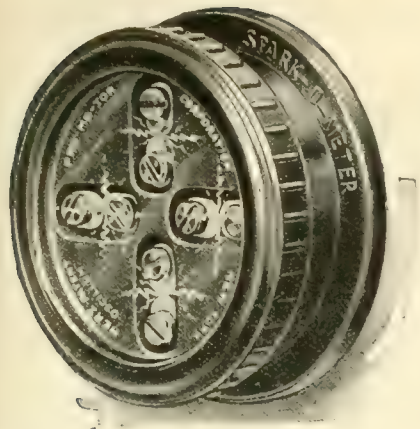


*Archer power hoist for dump trucks*



*Miracle blowout patch*





The oiler consists of one circular metal cover containing felt or absorbent material, one grooved, oblong back plate and two small coil springs. The cover, which is provided with a deep projecting recess or reservoir, is applied to the nearer side of the spring, so that the absorbent material presses against the edges of the leaves, with the metal back plate directly opposite on the other side of the spring. The two small coil springs, one above and one below the spring, hook into the eyes of the cover and back plate, holding the oiler in position.

To recoil, apply the oil can to the hole in the projecting part of the cover and fill the reservoir with oil. The price of each oiler is 30 cents. The manufacturer is the Sterling Mfg. Co., Cleveland.

### Miracle Blowout Patch

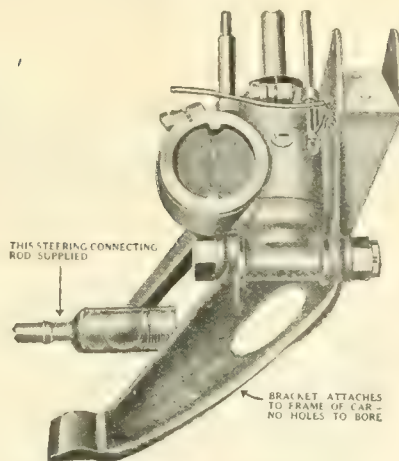
THE Miracle blowout patch is made of rawhide covered with rubberized fabric. Two flaps which tighten over the beads hold the patch in place. Perforations in the flaps allow the patch to be tied in position to simplify the adjustment. After a few miles service, the patch is said to slightly vulcanize itself to the shoe. The maker is the Rawhide Products Corp., New York City.

### Sprague Ford Steering Gear

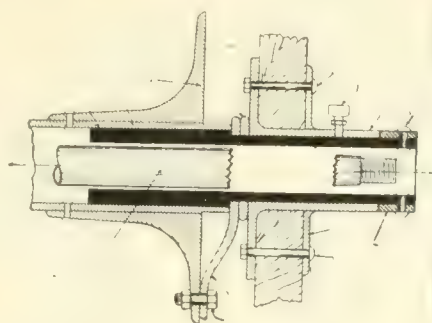
SPRAGUE steering gears for Fords are designed to eliminate the shocks and vibrations encountered in driving over rough roads. They can be installed in 1 hr. It is not necessary to drill any holes, as it bolts on the engine and frame of the truck. Five tools are necessary: 10-in. crescent wrench, pliers, screw driver, hammer and tinners, shears or chisel. The price is \$30. The maker is the Sprague Tire & Rubber Co., Omaha, Neb.

### Shambaugh Emergency Hub

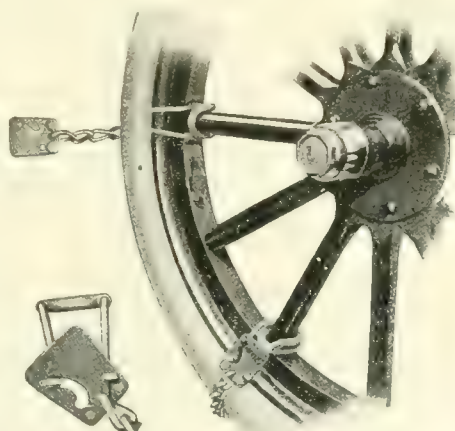
THE Shambaugh emergency hub consists of steel sleeve supporting a hub drilled to fit a Ford wheel. The sleeve is held within the axle housing and is fastened to the housing flange. It is used in towing cars which have broken axles or wheels, or locked gearing. The maker is the Shambaugh Mfg. Co., LaFayette, Ind.



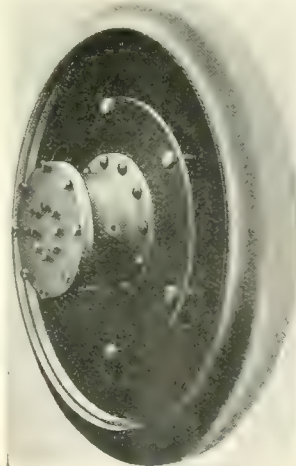
*Sprague Ford steering gear*



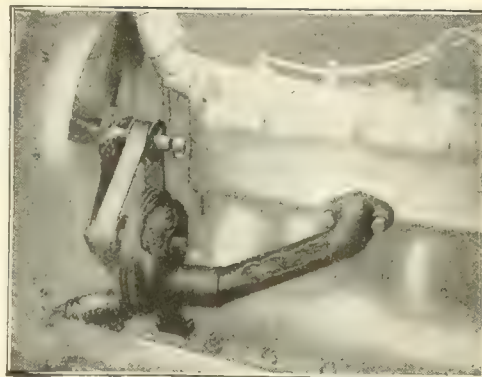
*Shambaugh emergency hub*



*Jiff-On tire chains*



*Midwest Stopshok wheel*



*Peerless water circulator*

### Peerless Water Circulator

THE Peerless water circulator is a centrifugal pump for installation in the Ford cooling system. It is driven from the fan drive, a special belt being provided for the purpose. The capacity of the pump is 5 gal. per minute. It is not necessary to drill any holes to mount the pump. All parts needed for its installation are furnished. The maker is Standard Auto Accessories Co., Chicago.

### Jiff-On Tire Chains

A SET of Jiff-On tire chains, which is an equipment for two wheels, consists of twelve chains—one for every other spoke. The chains are attached to the spoke by spring forms covered with rubber, which fit snugly. The price per set for 3- and 3½-in. tires is \$5. Made by the Midland Co., South Milwaukee, Wis.

### Midwest Stopshok Wheel

A NEW type of cushion wheel has been designed to reduce unsprung weight. It is so constructed that all road shocks are transmitted to a heavy helical spring mounted in the hub. These wheels have been tested on the road, and the manufacturers state that unusually satisfactory results have been obtained. The maker is the Midwest Engine Co., Indianapolis, Ind.

### Oscillum Spark Intensifier

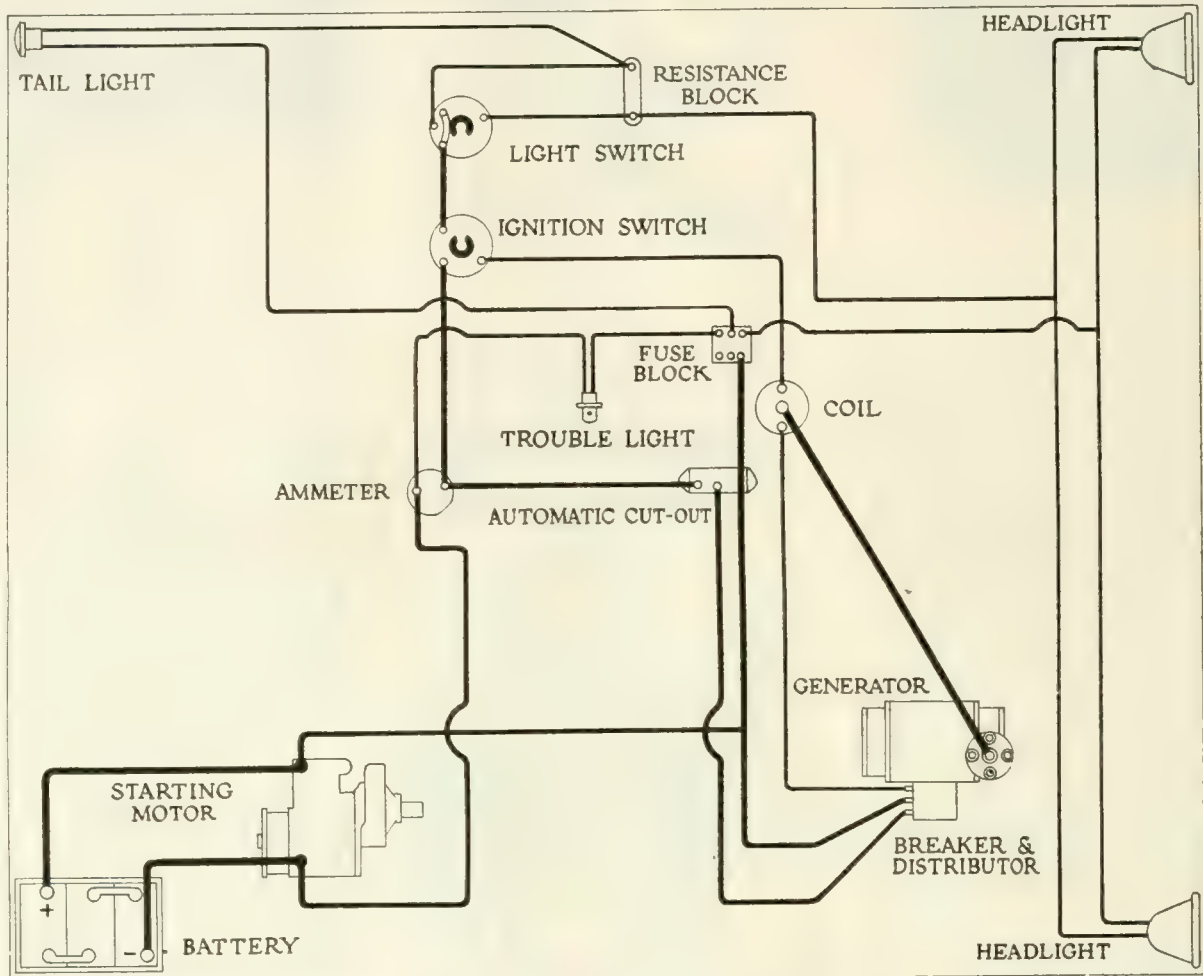
THE Herz spark intensifier, named the Oscillum, sets on the dashboard and permits the driver to watch whether the spark plugs are working properly. By intensifying the spark, it is possible to save gasoline by igniting a leaner mixture. The Pro-Mo-Tor Fabricating Corp., New York City, successor to Herz & Co., offers the device with cables and terminals to be attached to a Ford at \$7.50. The instrument alone, without cables, is obtainable at \$5. The Oscillum instrument for six-cylinder engines is now in preparation.

### Stoppit

THIS is a radiator compound for stopping small leaks. It is poured into the radiator and the engine run for 10 to 15 min. to circulate it. It also acts as rust and scale preventative. The price is 50 cents a can. The manufacturers are Cumings Bros., Flint, Mich.

# Motor Truck Electric System Wiring Diagrams

## 17—Starting and Lighting Unit on Reo Trucks



### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE.

1920	
1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting.....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15
1921	
12—Maxwell, Lighting.....	Jan. 15
13—International, Starting and Lighting....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 15
17—Reo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Next Issue

The Reo truck is equipped with a combined generator and distributor which is the chief source of current. It furnishes current for all requirements except at such times when the engine is not running or is running very slowly. At such times the current is furnished by the storage battery which in turn is kept charged by the generator. The battery also performs an important function in the regulation of the generator output and must, therefore, never be disconnected when the equipment is in operation.

The generator is in normal working condition if the ammeter shows a charge of about 12 amp. when running 15 m.p.h. on first starting and reduces this charge to about 4 amp. on becoming warmed up. The maximum charging rate of the generator when cold is 20 amp. and when warm, 11 to 12 amp.

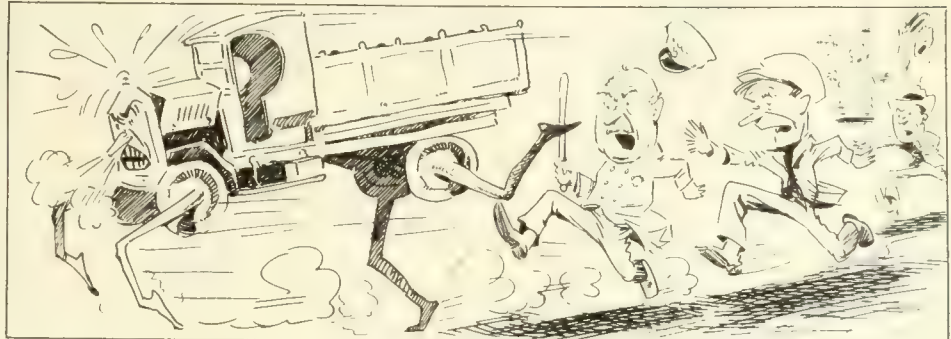
There are no adjustments in connection with the coil other than to keep the terminals tight. A safety gap for the protection of the coil is provided on the distributor.

Leaks in the wiring are most likely to be found in the lighting wires, sockets and connections and in the ignition wires. Leaks in that section of wires between the ammeter and battery are not registered on the ammeter, which should be borne in mind when looking for battery trouble.

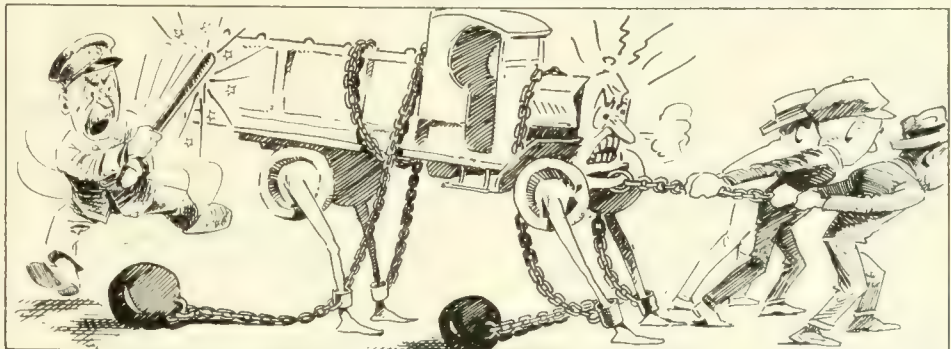


# Write to The Forum About It!

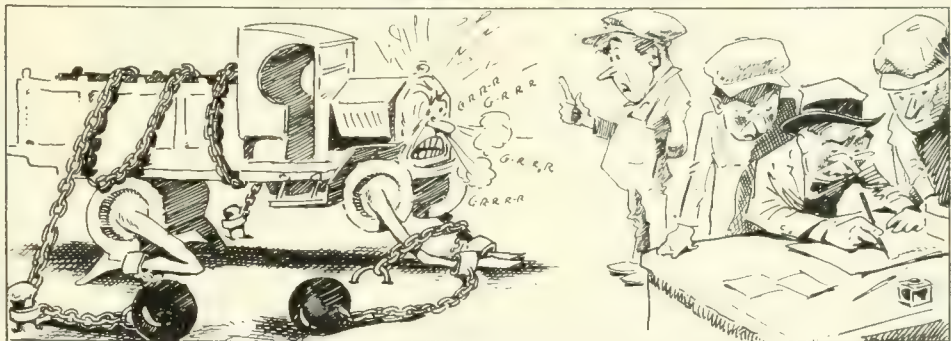
*Sometimes a Truck  
Will Develop  
Startling Symptoms*



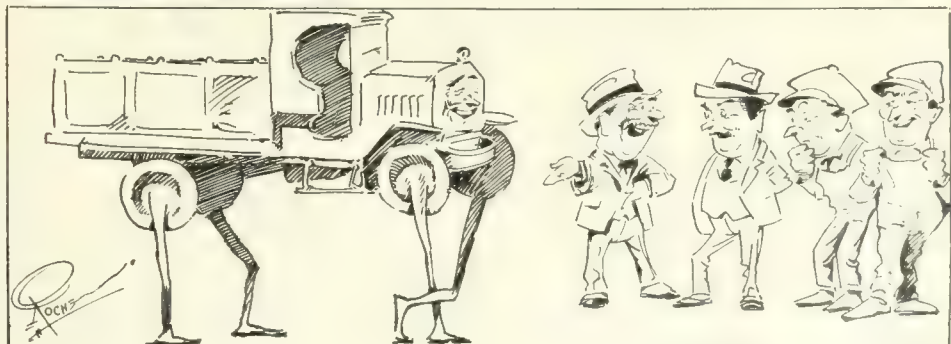
*Which Make It  
Highly Difficult  
To Operate*



*If You Cannot  
Find the Trouble  
Write the Forum*



*And When You  
Apply the Answer  
All Will Be Well*



## THE COMMERCIAL VEHICLE

239 West 39th Street  
New York City





## 500,000 Mileage of White Truck Too Much, Says Reader

To the Editor, COMMERCIAL VEHICLE:

I have read your issue of Feb. 15th, and find on page 49 the statement that a White truck had run 500,000 miles.

This seemed rather high to me and I did some figuring with the following results:

The White Co. built its first truck late in 1909 and to achieve this total, granting that the truck in question was one of the first they built, it would have had to run 45,454 miles per year or 124 miles a 24-hr. day, 365 days a year, and this means over 5 miles in every hour since it left the factory.

This is practically impossible, don't you think so?—JOHN W. BREWER, New York City.

Your estimate that the truck must have run 124 miles a 24-hr. day, 365 days a year for 11 yrs., is correct as an average but it must be remembered that it is only an average.

As a matter of fact, many trucks run as high as 250 to 300 miles in a single day on the excellent California roads and a daily average of this type on long distance mileage will soon bring the yearly run far above your estimate of 45,000 miles even for a 300-day year or less.

There is also a truck in New York making daily runs of 200 miles for a florist concern.

However, so much interest has been aroused over this question that we are now collecting specific instances from the actual truck users which will be quoted later in THE COMMERCIAL VEHICLE.

## Reader Wants Worm Axle and Clutch Information

To the Editor, COMMERCIAL VEHICLE:

Does it injure the worm or worm gear to coast a worm-driven truck on the hills, that is to hold the clutch out and let it run?

Will leaving the engine run and holding the clutch out on a hill burn out the lining on the clutch disks?

We have to reface or put in a new disk in the clutch every little while. We can find no reason for this, but they still continue to burn out. We have a very good driver on this truck and are at a loss to understand it.—H. L. GORMLEY, Lawrence Transfer Co.

It will not injure the worm-driven truck to coast on the hills. No damage will result other than what might be experienced on other types of drive. It is, of course, possible to design worm

**DEVOTED** to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

gearing which is efficient in one direction but which is self-locking when driven in the opposite direction. Such a gear, however, has never been used, to our knowledge, by any manufacturer of worm-gear truck axles.

Leaving the engine run and holding the clutch out on a hill will not burn out the lining on the clutch disk. There is either an interference of the clutch pedal bracket with the floor of the truck, which

## A Letter From a Reader

*"We have your letter of the 14th inst. with information on the Denmo truck for which we thank you. This is exactly the information we wished to obtain."*

## Can't We Help You, Too?

would not allow the clutch to release fully, or there might be something wrong with the clutch. We would advise that you write the Brown-Lipe Gear Co., giving it the serial number of the transmission or clutch so that the company will be able to tell what style of truck this clutch is used on. The company would also be able to tell what is wrong with the clutch and make suggestions to correct it.

## Lateral Shrinkage of Wood Felloe Is Correct

An error was made in the Forum Dept. in the March 1 issue. The reader was told that the reason why the spokes pulled away from the felloe band was because the spokes shrunk. We are told that wood shrinks laterally, not longitudinally. The real cause of the reader's trouble was lateral shrinkage of the wood felloe, not longitudinal shrinkage of the spokes.

Defective wood wheels may be caused by the use of green or unseasoned timber, but this is by no means the only cause. Frequently shrinkage and loosening of the wheel occur because of mis-

handling wood wheels by the truck maker or the user himself.

In the past year the Automotive Wood Wheel Manufacturers' Association has investigated several complaints and has found trouble due to the truck maker allowing his wheels to lie about the plant, unpainted, for months, and even longer, exposed to the atmosphere without protection. Naturally, the wood absorbed moisture and swelled.

Cases have been found where wood wheels were kept next to steam pipes and shrunk in the abnormally dry surroundings, and when then shipped out unpainted and unprotected they swelled when exposed to atmospheric conditions.

In a great many instances trucks have been operated without ever painting the wheels. In wet weather the wood naturally absorbs the moisture, and in summer or hot weather, or if kept next to steam pipes in the garage, the wood has shrunk and caused the wheel to loosen.

If kept properly painted at all times, wood wheels will seldom cause the owner the slightest trouble.

## Wet and Dry Weights of Woods Per 1000 Board Ft.

To the Editor, COMMERCIAL VEHICLE:

Please furnish us with a table of the weights of the various kinds of wood in pounds per 1000 board ft.—H. M., Summit, N. J.

The following tabulation gives the weight in pounds per 1000 ft. for the more common kinds of wood:

### Lumber—Per Thousand Feet

	Wgt. Dry Pounds	Wgt. Green Pounds
Black Ash .....	3,200	4,600
White Ash .....	3,800	4,600
Basswood .....	2,500	4,200
Beech .....	4,000	5,750
Birch .....	4,000	5,500
Butternut .....	2,500	4,000
Cherry .....	3,800	5,000
Chestnut .....	2,800	5,000
Cypress .....	3,000	5,000
Cottonwood ....	2,800	4,600
Rock Elm .....	4,000	5,400
Gum .....	3,300	5,400
Gum Sap .....	3,000	5,000
Hickory .....	4,500	6,000
Mahogany .....	3,500	4,500
Maple, Hard ...	3,900	5,400
Maple, Soft ....	3,300	5,000
Oak .....	4,000	5,500
Poplar .....	2,800	3,900
Poplar Bay ...	2,800	3,900
Sycamore .....	3,000	4,750
Walnut .....	3,800	4,900



## Excessive Oil Pumping in the Engine and Its Remedy

To the Editor, COMMERCIAL VEHICLE:

Please give me a good method for stopping an engine from pumping oil. I am thinking of changing the force feed to a splash system. Is this advisable?—A. SPREYER, New York City.

Wherever there is any lubricating oil dilution, there is also bound to be oil pumping as soon as the oil is diluted to such an extent that it no longer retains its body.

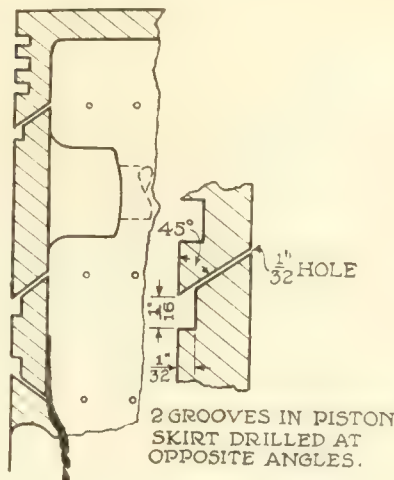
A large oil company recently made an elaborate test to determine the amount of dilution of the lubrication oil. It was found that on most motor vehicles driven around Chicago, that the greatest amount of oil dilution occurs within the first 100 miles of travel after filling up with new oil. Therefore, the greatest evil to fight in oil pumping is the danger that precedes the actual pumping and this is the oil dilution, for if the oil dilution can be eliminated the oil will retain its body and, therefore, there will be no oil pumping. Of course, if the valve stems do not fit tightly in their guides there is apt to be some blowing by here that will cause dilution but this is a question of inexcusably poor workmanship.

It is better to run the truck a while and observe every precautionary measure necessary to keep the engine warm, before any expensive service is undertaken in an attempt to correct oil pumping difficulties. When, for instance, aluminum pistons are used, and there is no provision to take up for the expansion, there must be some clearance between the piston and cylinder. It must also be remembered that an engine with aluminum pistons is much better cooled than one with iron pistons, everything else being equal. The heat radiating and transference ability of aluminum is about two times that of iron and, therefore, with aluminum pistons the combustion temperatures will be cooled off very rapidly.

If it is found that oil pumping cannot be remedied by strict observance of the engine operating temperature it will be found advisable to machine some grooves in the piston. By cutting three grooves in the piston, one above the piston pin and the other two in the skirt of the piston and cut as shown in the accompanying illustration, these grooves together with oil relief holes will practically eliminate any oil pumping.

The grooves should be carefully machined. The width in skirt of the piston should be 1/16 in. and the depth of the cut into the piston should be 1/32 in. The inclined edge of the groove should be cut with a very finely pointed tool leaving a perfectly sharp edge. The other edge of the groove should be horizontal. The first groove from the top should have its inclined edge at the top as should the middle groove. The lower groove can then be cut with its bottom edge inclined.

After the grooves have been cut, a number of holes should be drilled even with the inclined edge of the groove. Approximately fifteen holes are needed for



*Method of grooving pistons to remedy excessive oil pumping*

each groove, spaced evenly around the circumference of the piston. These holes should measure 1/32 in. in diameter, or a No. 66 drill will do.

There is one more operation on the piston before it is completed and this may be performed while the piston is

## The Forum Solves Problems!

THE COMMERCIAL VEHICLE Forum Dept. will answer any question on trucks and trucking such as those on this page.

If you have any problem, write to the Forum about it!

## Let Us Help Solve Yours!

still in the chuck on the lathe. The bottom edge of the piston skirt should have a hemispherical groove turned in as shown in the illustration. The purpose of this groove is to reduce the amount of oil that is deposited on the cylinder wall and thus lessen the amount of oil that the grooves will have to remove. Any oil that is splashed up inside the piston from the throw of the rods must drip back by following the inside surface of the piston. When the oil comes to the bottom of the piston edge it will tend to keep on flowing and naturally will run off into the cylinder wall. But if a groove of the kind shown is cut in the piston the oil cannot flow back to the cylinder wall for it would then have to flow up hill in working up and around the hemispherical groove. It therefore drips off the inside edge of the piston.

## Clutch Grabs With a Chattering Effect While Starting

To the Editor, COMMERCIAL VEHICLE:

The clutch in my Mack grabs with a chattering effect while starting before the clutch is fully engaged. What should I do to stop this?—M. D., Waterbury, Conn.

Your trouble may be traced to poor

adjustment. Your clutch is of the dry-multiple-disk type, comprising six disks, faced on each side with asbestos fabric, and six steel driving disks. These are driven by teeth on the hub and casing, respectively, of the clutch. There are two springs, one within the other enclosed within the hub and adjustable by the three nuts at the back of the clutch. There is a clutch brake to facilitate gear shifting by stopping the spinning of the shaft when the clutch is released. This is also adjustable for pedal position.

The chattering to which you refer is probably a result of uneven pressure on the disks due to one of the adjusting nuts having been turned more than the others. If this is the case it is advisable to remove the clutch and unscrew all three bolts until their threaded ends are flush and then make a readjustment. Before this is done, it would be advisable to turn up the bolts as the trouble may be caused by a slipping clutch.

Remove the hand hole cover and turn each of the three drum bolts one-half turn to the right. A click will indicate a half turn. There is a possibility that the chattering is in the universal joints. The worm-driven models have three universal joints in order to avoid excessive free shafting length which would cause whipping of the shaft. Checking the alignment of the shaft and the condition of the universal joints is advisable.

## Ford Valves Do Not Seat Properly—Springs Weak

To the Editor, COMMERCIAL VEHICLE:

The valves on my Ford do not seat properly. I believe that the push rods stick and thus hold the valves open. Putting gasoline around the push rod and guide to cut the dirt does not seem to help. What would you advise doing?—READER.

If the valves do not seat properly it may be logically attributed to weak or broken valve springs. Weak inlet valve springs will not produce a noticeable effect upon the running of the engine but weak exhaust valve springs will cause uneven running. This is due to the fact that the exhaust valves do not close immediately which allows a certain portion of the charge under compression to escape thus reducing the force of the explosion.

A good way to test for weak springs is to remove the valve plate and insert a screw-driver between the coils of the spring with the engine running. If the speed picks up it indicates a weak spring. The only remedy in this case is to install new valve springs. There is also a possibility that warped valve stems contribute to the trouble. However, if the valves are in good condition they can easily be trued. If you will examine the valve and valve seat you will probably find both pitted and coated with carbon. This can be remedied by grinding in the valves. If carbon causes frequent trouble indications are that the pistons are pumping oil. This being the case the only remedy is to have the cylinder block reground or rebored and oversize pistons and rings fitted.



## Keeping the Air Hose Off the Floor for Protection

To the Editor, COMMERCIAL VEHICLE:

We use an air supply line in our garage and find it a great time saver. On the other hand, we are troubled with the hose being in the way when the trucks come in or leave the garage and find as a result that our expense in replacing hose worn out or rotted is considerable. Do you know of any good scheme for saving the hose from this wear and tear?—H. JOHNSTON, New Haven, Conn.

This problem was solved by a very simple system devised by the Post Office Department in its Toledo, Ohio, garage. At every air station in its garage, the hose is attached to a pulley line which automatically lifts the air hose off the floor. This is accomplished by the use of a 12-lb. weight that is attached to the other end of the pulley line. It is manifest that upon the release of the air hose the weight's motion downward will yank the line working on the pulley upward and at the same time lift the air hose off the floor.

The weight is suspended in a box 12 ft. high and 5 in. square. The box serves as a guide for the weight and at the same time as a protection.

All that a driver has to do is to pull the air hose tire attachment down to the valve stem in the tube, hold it there until the inflation is completed, and then release the hose. It will then be raised off the floor by the 12-lb. weight.

The cost of the whole outfit is about \$3. The weight costs 60 cents, the rest of the expenses being consumed in the purchase of four 12-ft. boards, the pulley and the line.

## Difference Between Degree and Per Cent of Grade

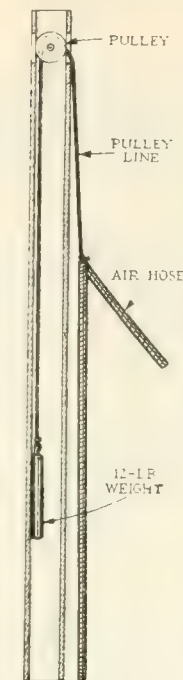
To the Editor, COMMERCIAL VEHICLE:

To settle an argument, will you please explain fully the degree and the per cent or grade on hills?—D. BROWN, East Orange, N. J.

To answer your inquiry, we will quote as follows from one of the engineering data sheets of the Troy Wagon Works Co., Troy, Ohio, which explains the difference very well:

"The tendency of the man who measures with the eye, particularly if he is not a trained engineer, is to greatly overestimate a grade. For instance, the average Pittsburgher is sure that his city abounds with 20 per cent grades and is indignant if you suggest that a 10 per cent grade is a tremendous rise even for Pittsburgh. Yet the city engineer's profiles show that the best known and most feared grades in Pittsburgh are only around 5 per cent.

"Correct information on grades is essential to a proper study of most transportation problems. This is particularly true as far as trailer usage is concerned. Many a truck owner, when told that his particular truck will not handle trailers satisfactorily on grades over 10 per cent at once assumes the trailer has no place in his business. Generally the



*Pulley arrangement for keeping the air hose off the floor. This method is used by the Toledo post office department*

facts are that what he considers a 15 per cent grade is a 5 per cent grade, and he has an excellent trailer proposition without knowing it.

"Among many motor truck dealers and purchasers there is much doubt regard-

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

Make use of it.

The editors will be glad to answer any questions which you ask.

## Answers

ing the exact meaning of the word grade. Of course, a grade is a hill or an incline, but just how is its 'steepness' measured?

"The steepness is actually expressed in terms of per cent, or the ratio of rise to distance traveled. Thus, if a road rises 10 ft. in every 100, it possesses a 10 per cent grade. If it rises 10 ft. in every 50 (which would be 20 ft. in every 100), we would have a 20 per cent grade. The percentage of the grade is determined by dividing the vertical height which the truck has been lifted by the total distance required to rise to that height, assuming, of course, that curves have been eliminated and that the hill is a straight line. The famed Pike's Peak Highway, which is 12 miles long and rises some 6000 ft. into the sky, has an average grade of only 10 per cent.

"There is a great tendency on the part of many persons to confuse the per cent of a grade with its angle express in degrees. There is thus the popular impression that a 50 per cent grade, if one ever actually existed, is a 50-deg. angle.

"A 45-deg. grade is approximately one

of 70 per cent, whereas a 45 per cent grade is inclined at an angle of about 27 deg. In the accompanying table, the grade in per cent is given in the left-hand column, while the corresponding angle in degrees is shown on the right:

Difference Between Degree and Per Cent of Grade

Grade	Angle
5 per cent	2.8 degrees
10 " "	5.7 "
15 " "	8.5 "
20 " "	11.5 "
25 " "	14.5 "
30 " "	17.5 "
35 " "	20.5 "
40 " "	23.5 "
45 " "	26.75 "
50 " "	30 "
55 " "	33.3 "
60 " "	37 "
65 " "	40.5 "
70 " "	44.5 "
75 " "	48.5 "
100 " "	90. "

## Information on Cost Upkeep Per Ton-Mile

To the Editor, COMMERCIAL VEHICLE:

Will you kindly give me chart or other system for arriving at cost upkeep per ton-mile?—E. L. DOOLAY, Cranbrook, B. C.

It would be difficult fully to explain the method of supplying this phase of truck recording because the final cost per ton-mile depends on so many factors of truck operation and upon the truck itself. However, this question has been more fully and satisfactorily answered in the instruction book on THE COMMERCIAL VEHICLE Standard Cost Keeping System than is possible in a letter. The cost upkeep per ton-mile is arrived at by dividing the total cost for a month or other period on which records are desired, by the number of ton-miles of work performed during that period. THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks has been devised and printed for the benefit of fleet owners. In designing this instruction book, the thought has been to combine the necessary completeness of details with simplicity of form which will enable anyone to keep this record without a great deal of complicated mathematics. It is also designed to show the required factors in such a manner that any details of cost operation or actual truck performance can be ascertained at a glance. In order to keep this record, a driver's record card is also necessary and a card of this type has accordingly been devised for the use of fleet owners.

## Method of Testing for an Open Circuit on Truck

To the Editor, COMMERCIAL VEHICLE:

Please give method of testing for an open circuit or high resistance joints between the generator and battery.—D. PLUMB, Newark, N. J.

Remove the two generator cables, taking care that the insulated ends do not



touch each other or touch any part of the truck. Next, remove one of the large head lamp bulbs and hold one of the cable terminals to the center contact and the other cable terminal to the outside of the bulb base. If the bulb lights to full brilliancy and the meter does not show discharge (by pointer indicating to the left of zero,) the fault is with the meter and it should be replaced. If the lamp fails to burn, there are high resistance joints or an open circuit between the generator and battery, or else the battery is completely discharged.

If none of the lamps on the truck can be operated and the specific gravity of the battery is low, the trouble is due to the battery. A leaky battery cell which permits all of the solution to escape, will not be able to operate the lights, and the meter will not show a charge when the engine is running. A leaky cell will also cause the generator field fuse to blow.

If the battery is not charged, and the head lamp bulb connected to the cable terminals fails to burn, this shows that the circuit between the generator and the battery is opened or the connections in this circuit are making poor contact. Examine the grounded cable contact from the generator to the right side of the cross member. See that this connection is free from paint and making good electrical contact. Inspect the connections on the fuse and junction block to see that the generator and meter leads are held firmly in place. The connections at the meter should be inspected to see that these wires are not loose, but are held tight by the nuts.

The battery terminals should be inspected to see that they are tight and free from any corrosion. If any corrosion exists, the battery connectors should be removed and carefully cleaned. A blown generator field fuse should not be replaced until the trouble causing the fuse to blow has been found and remedied. Never replace a generator field fuse with anything except a similar fuse.

## Reasons for Putting Flesh Side of Leather Out on Clutch

To the Editor, COMMERCIAL VEHICLE:

Is it better to put the flesh side of clutch leather out or the smooth side?—C. S. W., Boston.

According to the recommendation of the large belt makers the grain side of the leather should be placed next to the pulley. It is claimed to have a much better co-efficient of friction and that it is possible to get approximately 33 per cent more power by placing the belt in this manner. The grain side of the leather has a velvety surface while the flesh side is very hard. In the case of the leather cones the flesh side is usually placed out. This is probably because plenty of friction can be obtained and the surface being harder will have much better wearing qualities. There is very little danger of the surface becoming glazed if the leather is properly cared for and it is possible to soften the leather by applying Neatsfoot oil.

## Worm Drive in Use Since 1912 —On Four Models

To the Editor, COMMERCIAL VEHICLE:

Will you please tell me in what year the first worm-driven truck was built and what has been the increase by years of this form of drive?—H. H. B., Newark, N. J.

The worm-drive first appeared in 1912 on four models of American trucks, made by three companies. The trucks using the worm drive were the Franklin 1-tonner, Blair 1½- and 2½-tonners and the Pierce-Arrow 5-tonner.

The following tabulation shows the increased use of the worm drive during the years from 1912 to date, showing a steady increase, until to-day there are 527 models of trucks using this form of drive.

Year	No. of models using worm drive
1912	4
1913	8
1914	15
1915	42
1916	90
1917	237
1918	308
1919	325
1920	459
1921	527

## Knowledge Is Power

Are you handicapped for facts?

Is there some problem that is annoying you and holding you up in your business?

Let us solve it for you!

This forum is for you. It is a regular feature in each issue.

## Let Us Serve You

## Weights of Materials Given in Pounds Per Cubic Foot

To the Editor, COMMERCIAL VEHICLE:

Please publish the weights in pounds per cubic foot of metals, coal and coke, rock, stone, brick, cement, and grain.—F. TODD, Chicago.

Metals	Pounds per cu. ft.
Aluminum	167
Brass	523
Bronze	552
Copper	552
Iron, Cast	446
Iron, Grey Foundry	450
Lead	710
Nickel	549
Steel	490
Zinc	437

## Coal and Coke

	Pounds
1 bu. (Bitum. Coal), 1.55 cu. ft.	75
Anthracite Coal, 1 cu. ft.	66
Bituminous Coal, 1 cu. ft.	55
Cannel Coal, 1 cu. ft.	50
Charcoal, 1 cu. ft.	20
Coke, 1 cu. ft.	32

## Rock

	Pounds per cu. ft.
Andesite	181.0
Basalt	181.0
Diabase	187.0
Diorite	187.0
Granite	168.0
Limestone	168.0
Limestone, loose	96.0
Marble, Italian	169.0
Marble, Vermont	165.0
Marble, loose	96.0
Porphyry	170.0
Quartz	162.1
Rhyolite	149.6
Sandstone	149.6
Schist	168.0
Shale	162.1
Slate	175.0

## Stone, Brick, Cement, Etc.

	Pounds
Asbestos, cu. ft.	192
Asphalt, cu. ft.	100
Asphaltum, cu. ft.	87
Brick, soft, cu. ft.	100
Brick, common, cu. ft.	112
Brick, hard, cu. ft.	125
Brick, pressed, cu. ft.	135
Brick, fire, cu. ft.	104-150
Brick, sand lime, cu. ft.	136
Cement (Portland) barrel	380
Cement (Portland) bag	94
Cement (Natural) barrel	285
Cement (Natural) bag	94
Concrete, cu. ft.	120-155
Lime, per struck bushel	75
Lime, per cu. ft.	55
Mortar, cu. ft.	110
Plaster of Paris, cu. ft.	93-113
Stone, crushed, cu. ft.	100

## Grain

	Pounds
Barley, bushel	48
Bran, bushel	20
Corn, shelled, bushel	56
Corn, in ear husked, bushel	70
Corn, in ear unhusked, bushel	72
Oats, bushel	30
Rye, bushel	56
Wheat, bushel	60

## Wants Information for Arriving at Tire Records

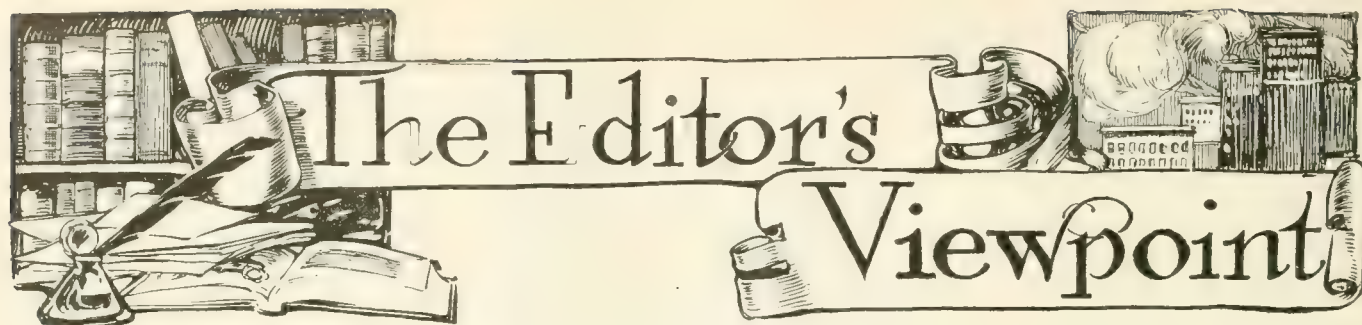
To the Editor, COMMERCIAL VEHICLE:

Will you kindly give me chart or other system for arriving at tire records, (depreciation, etc.)?—E. L. DOOLAY, Cranbrook, B. C.

The usual method for arriving at depreciation on tires is based on guaranteed mileage. The total cost of the tires is divided by the total guaranteed mileage to arrive at the cost per guaranteed mile. This is then multiplied by the number of miles which the truck has run in order to arrive at the cost for tires during the period.

## Independent to Make Truck

YOUNGSTOWN, OHIO, March 5—The Independent Motor Truck Co., this city, will soon get into production on a 3½-ton truck. The company has been in process of development for 3 years.



## Service on Units and Unit Parts

A NEW star of hope has risen in the fleet owners' skies—the possibility of direct service on parts from the parts manufacturer to the fleet owner, or to the distributor.

Up to now there has been much floundering in the dark over the question of prompt parts service at fair prices. Some truck owners buy their replacement units and parts direct from the parts manufacturer. Some buy direct from the manufacturer of the assembled truck. And some buy from dealers. Still others buy from independent manufacturers of unit parts.

There are advantages and disadvantages to all these methods. But it must be remembered that the plan has nothing to do with service labor—for most fleet owners have their own service stations. It deals only with the supply of material.

When parts are bought direct from the parts manufacturer or from the assembler, there is often a delay sufficient to tie up the fleet owner's truck for some time, which may cost him a lot of money. On the other hand, he is getting the standard part he wants, he knows that it is not an inferior article and he sometimes may get it cheaper than he can get it through the dealer.

Then there is the question of buying from the dealer. There are good dealers and poor dealers. And there are dealers who carry an adequate stock of parts and those who do not. Thus the dealer may not have the part required on hand. Also, if he has it on hand, he will charge more for it—he *must charge more for it*—than the parts manufacturer may charge. On the other hand, if the dealer *has* the part required on hand, the fleet owner will get it quicker than by any other method.

Lastly, some fleet owners buy their replacement parts from so-called independent parts manufacturers, who manufacture the different small parts that make up truck units. In one way this is the cheapest, and it is quick. But it carries the serious disadvantage that the fleet owner cannot be sure that he is getting a reliable part that will give as good service as the trade-marked article.

Then, too, the fleet owner may have to go to the dealer for certain things, so it may be more convenient for him to go to the dealer for everything, rather than to deal with two or more different concerns in servicing the same truck.

Now, the parts manufacturers have started a plan

which may mean servicing parts direct to the fleet owner, through the manufacturers' own stations. The idea is to establish 60 main service stations with 180 branches for the servicing of these parts. This will give a maximum 6-hour service to the fleet owner wherever he may be located. The stations will carry full lines of all parts entering into any make of assembled truck. The parts will be trade-marked and will sell a little above cost. They have already established 30 of these stations.

The question of adequate and prompt parts service is essentially a fleet owner's problem. And, eventually, the fleet owner will settle the question. The fleet owner holds the purse strings, for he buys the trucks and the parts. The demand creates the supply—and the supply must ever follow, more or less obediently, at the heels of the demand.

But instead of getting up on our hind legs and making our wants known—and in no uncertain tone—the fleet owners of the country up to the present time have contented themselves with sitting back, running their businesses as best they can with a poor service on parts—and letting it go at that.

There is a reason for this. The fleet owners of the country are not organized. They have no means of forming a consensus of opinion on what they do want.

But it is high time all this was changed. It is high time the fleet owner made up his mind what service he wants. It is high time he made up his mind what will best give him that service. And it is high time that he got together with the other fleet owners and arrived at a standard opinion and a plan of campaign on the best way to go after that service.

When he has got that far, it won't take him long to get the kind of service he wants, whether on truck parts or anything else.

What do you think of the parts manufacturers' plan? Do you believe it will give you the service you want? Or would it be better to have all dealings as regards the truck with the party through whom you bought it—presumably, the dealer?

These are points which the fleet owner must decide for himself, from his own experience. But the main thing is that he must, like Oliver Twist, make his wants known if he has any expectation of getting what he wants. Otherwise, things will drift along as before and the fleet owner will be a negligible quantity, taking what the others choose to give him.



## Plan Better Service for Truck Parts

### Users of Assembled Trucks to Have 6-Hr. Service from Parts Depots Planned

DETROIT, March 21.—Plans evolved by the larger unit manufacturers in co-operation with leading truck makers for parts servicing of assembled trucks, that are expected to convince the buying public of the advantage of the so-called assembled vehicle, are being developed into workable and practical form. Thirty major stations where standard unit parts can be obtained by distributors and dealers already are operating successfully. The plan ultimately calls for twice this number of major stations and sufficient sub-stations in every part of the United States to cover the territory so that no fleet owner will be more than six hours away from the nearest parts depot. These depots ultimately will carry complete stocks of parts. It is estimated \$5,000,000 will be invested in this plan when it is in complete operation.

There are many good reasons for the plan, one of the chief of which is the education of the public to the knowledge that its interests can be best served in the operation of the assembled truck by reason of access to stations where parts can be secured quickly and cheaply.

Under the old system where parts service is handled by the dealers, many duplicate stocks are carried in each city. This has proved not only uneconomical but also involved an excessive overhead. The new system standardizes the entire method of distribution so that a complete stock is to be carried in one central depot in each important city. Such an arrangement, manufacturers contend, will so standardize the parts as to make it possible to handle it on such an efficient and economical basis that a tremendous sales asset will be given the assembled product. This new plan does not in any way eliminate the carrying of parts stocks by manufacturers or their distributors, and dealers, if they so desire.

What naturally would seem to be more vital is the fact that all automotive producers realize the development of their business, in truth the life of the industry, hinges on service. The conditions affecting the industry in the last few months which have brought disaster to some of the weaker manufacturers, have stimulated efforts of assemblers and leading unit manufacturers to put the assembled vehicle on a better basis from a service standpoint than the products of the manufacturers who build the greater part of their product under one roof.

With the plan of unit manufacturers and assemblers in full operation, it is contended the repair problem will have been solved, and with normal buying restored, assembled products can be offered at lower prices. With the problem of heavy inventories eliminated and the

advantage of having practically no investment in the way of manufacturing equipment, the assembler is in a much more advantageous position, and with the development of a market for his product, through this service plan it is contended he can produce on a quantity basis and compete more successfully than heretofore.

### Insurance Companies Drop Full Coverage

NEW YORK CITY, March 19.—An important step toward reducing the number of motor vehicle accidents and toward lessening insurance collision rates has been taken by the Aetna Life Insurance Co. and its affiliated companies, the Aetna Casualty & Surety Co. and the Automobile Insurance Co. of Hartford, Conn., in eliminating the sale of full coverage collision insurance from March 9 on. Under the new plan only that form of collision insurance which provides for the insured paying the first \$50 or \$100 of each collision loss will be sold.

This action has been taken individually by the companies, and is designed to throw the burden of careless and negligent motor vehicle operation upon the operator. Insurance brokers and agents have been notified of the company's action and the reasons for it. Their support has been particularly sought in a movement to eliminate full collision coverage insurance in the Greater New York zone because of the heavy traffic.

By making this change, company officials expect to accomplish something more effective and constructive in the way of reducing preventable insurance accidents than the mere action of increasing rates.

### Truck Dumping Bill Killed

WASHINGTON, March 17.—President Wilson's pocket veto of the Army Appropriation bill put an end to legislation designed to sell or transfer surplus army trucks. The Senate and House had passed the bill as received from conference in which the House conferees had prevailed upon the Senate managers to an amendment requiring the sale of not less than one-half the surplus trucks and passenger cars.

### Rate Regulation by State

DOVER, DEL., March 17.—There is pending before the Delaware Legislature, now in session, a resolution the object of which is a nation-wide move to have state governments regulate motor truck freight rates. It was introduced a few days ago by Senator Bennett, who lives in the lower part of the state. After reciting the fact that every increase in railroad rates is likely to be followed by increased truck freight charges, it calls upon Governor Denny of Delaware to ask other governors to confer with him relative to the matter of having the states regulate rates.

The resolution has been referred to a committee, where it probably will lie in soak until the time is considered ripe to bring it out and air it.

## Railroad Experiments with Motor Trucks

### New York Central Tries Out Store-Door Delivery of Express Matter

NEW YORK CITY, March 17.—An interesting experiment in the store-door delivery of express matter is being undertaken by the New York Central Railroad Co. in co-operation with the American Railway Express Co. The plan is being tried out first in Chicago and Cleveland and standardized trucks are being used in its development.

A. H. Smith, president of the New York Central, has been much impressed with the possibilities of the motor truck as an auxiliary to the railroad. After careful consideration of the subject, his engineers recommended the construction of special express cars which would carry nine steel containers uniform in size which could be loaded from the trucks at the point of origin and unloaded to trucks at the destination.

The trucks are to be driven to the point where the merchandise is to be loaded and then to the railroad yards, where the containers will be hoisted onto the specially constructed cars. When the destination is reached, cranes will lift the containers to the trucks and the merchandise will be delivered directly to the establishments of the consignees.

Each container is 9 by 6 ft. and has a capacity of 6000 lb. It is estimated that the cars which carry them can be loaded and unloaded in 40 min. If the plan proves as successful as is expected it will be extended to the main shipping points throughout the New York Central System.

### Files Truck Rates

NEW YORK CITY, March 25.—Probably the first motor truck tariffs ever filed from this territory with the Interstate Commerce Commission have been sent to Washington by the Williams Shipping Agency, Inc., operating the Williams Terminal Dispatch. These tariffs cover highway transportation from New York to Port Chester, N. Y., Stamford, Norwalk and Bridgeport, Conn., Newark, New Brunswick and Trenton, N. J., and Philadelphia.

Tariffs filed include those for a pick-up and delivery service among warehouses, terminals, factories and steamship piers in New York to act as feeder for long distance motor truck hauling and for consolidated freight car service to inland points.

The goods are insured while in transit and are received, transported and delivered subject to the terms and conditions of the uniform bill of lading, which is the form of receipt issued by the carrier to the shipper.

The carrier also undertakes to render a C. O. D. service at varying rates based upon the value of the merchandise carried.



## Urge Use of Trucks in Harbor Project

### Cutting Transportation Costs a Problem in New York Port Development

NEW YORK CITY, March 24.—Fleet owners in this city are deeply interested in the pretentious harbor development project undertaken by the New York and New Jersey Port and Harbor Commission. The question of transportation is now being discussed. The New York Chapter of the American Society of Mechanical Engineers has gone on record in favor of the use of motor trucks. The alternative plan suggested by B. F. Cresson, chief engineer of the commission, is the construction of an electrical operated subway system extending all the way around the port through which loaded freight cars would be sent, with distribution points for rapid loading and unloading. It is estimated that such a subway would cost \$280,000,000.

The engineers have taken the position that the same work would be done by motor trucks at only a fraction of the cost and no serious engineering difficulties would be involved in their use.

The chief advocate of the motor truck interests is B. F. Fitch, president of the Motor Terminals Co., of Cleveland, Cincinnati and Chicago. Fitch also heads a similar company which has been incorporated in New York. It is his contention that the use of motor trucks for such work would not be in any sense experimental and that development of the harbor in this way would consume only a fraction of the time required for the construction of a subway. If the use of trucks is decided upon, thousands of them would be required for the work.

### Truck Tax, 100 Per Cent More

DETROIT, March 24.—A bill has been introduced in the legislature increasing the tax on trucks and trailers more than 100 per cent. Under the bill the horsepower fee would remain 25 cents, but the fee based on weight would be increased from the present 35 cents per 100 lb. to \$1.

### Plan Mobilization of Trucks

WASHINGTON, March 16.—Serious thought is being given by the administration to the possibility of a general railroad strike as a result of the announcement by nearly all roads that the wages of all classes of employees will be drastically cut in the interest of economy and in the hope that lower freight rates can be given to stimulate business.

The Council of National Defense is preparing for a mobilization of the motorized transport to prevent suffering and economic disaster throughout the country. It is known that the council has devised a plan for the allocation of motor trucks.

Communications received from govern-

nors show that in the majority of States, at least, it will be an easy matter to organize an efficient transportation system over the highways. The Federal Government, however, is not prepared to render assistance in highway transportation in any such proportion as heretofore. The depletion of War Department trucks through sales has been rapid during the past year.

According to army officials there are 19,000 trucks which are available for army purposes. Out of this total 13,000 trucks are in active service with the military service. The other 6000 machines could be placed on the road for service on receipt of an order from the Secretary of War.

### To Make 3-Ton Hudson Truck

PHILADELPHIA, March 25.—W. F. Hudson, president of the Hudson Motor Specialties Co., this city, inventor of the Hudford and Flexo, is forming a company to build a 3-ton truck which will embody in its construction a number of Mr. Hudson's patented features. The name of the truck will be the Hudson—the name of the company will be the Hudson Motor Truck Co.

### New 5-Ton Federal

DETROIT, March 21.—Federal Motor Truck Co. is showing a new 5-ton model at the automobile show, priced at \$5,350. The new truck is equipped with a specially designed Continental four-cylinder engine, 4¾ by 6, and is geared to permit extra high speed, adding materially to the efficiency of the truck.

### Boston Railway to Adopt Buses

BOSTON, March 18.—Motor buses will soon be adopted by the Boston Elevated Railway, the Public Utilities Commission consenting to accommodate traffic over lines which at present do not warrant the expense incurred in maintaining tracks and costly heavy street cars. Already the commission has been asked by the "L" for permission to operate such vehicles.

### Correction

In a description of the new line of trucks made by the General Motors Truck Co., published in the March 15th issue of THE COMMERCIAL VEHICLE, it was incorrectly stated that the company was located in Saginaw, Mich. The correct address is, of course, Pontiac, Mich.

### Coming Events

- 1921  
 March 28 April 2, Columbia, S. C., Truck Show at Exposition Bldg., State Fair Grounds.  
 April 4-9, Gloversville, N. Y., Truck Show. Gloversville - Johnstown Second Annual Show. Armory under auspices of Company G.  
 April 4-9, Seattle, Wash., Truck Show at Arena and Hippodrome.  
 Sept. 2 weeks, Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.

## New York Truck Tax Bill Passed

### Lowman Bill Calls for Fee Increase Which Hits All Truck Capacities

ALBANY, N. Y., March 24.—The Senate today passed the Lowman Bill for increased registration fees after a sharp attack by Senator Lusk upon automobile clubs which he declared were banded together to keep the State from raising by motor vehicle taxation money necessary for the maintenance of its good roads system.

Increases in passenger car registration fees under the bill will range from \$2.50 on low powered cars to \$6 on high powered ones. On motor trucks the increases will range from 35 per cent on lighter vehicles to 50 per cent on those above 5-ton capacity, and as high as 100 per cent on the truck of 10-ton capacity or over.

Senator Lusk condemned the practise which exempted a motor vehicle from taxation as property because it paid an annual State license fee.

### Overhauling the Mack Truck Engine

(Continued from page 143)

camshaft gear. Inspection and replacements can then be made. The camshaft can also be withdrawn through the front of the engine without further disassembly.

In reassembling the camshaft it is of course necessary to see that the gears are meshed with the teeth engaged as before, so that the timing will be the same. For this purpose the teeth on the camshaft gear are marked at the factory. The oil pump gear is cut integrally on the camshaft and needs no attention.

To remove the AC engine to an engine stand, unfasten the water, gasoline, spark and other connections, unbolt the rear cross frame member from the frame (not the engine), loosen the front universal joint behind the flywheel, attach a hoist or crane to the engine and then withdraw the pin from the front cross beam engine support, cast off fan belt and lift engine out.

The AB engine is removed as a unit, it not being necessary to dismount the radiator or break the water connections. The instrument board is mounted on the back of the rear cylinder block. When the powerplant is removed from the chassis it is not necessary to disconnect the oil pressure gage nor the ignition switch.

The removal of both engines is facilitated by the use of engine lifting eyes which are threaded to interchange with the valve port plugs and permit the engine to be lifted from the chassis without a sling. These eyes are threaded into the valve ports in place of the usual plug, being placed in cylinders two and three, or one and four.



# The COMMERCIAL VEHICLE

Read by Fleet Owners

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. C. Building  
239 West 39th Street, New York

## CONTENTS

Vol. XXIV, No. 6

April 15, 1921

### LEADING ARTICLES

Holding Your Own—And Then Some.....	169
What Trucks Are Doing.....	182

### MISCELLANEOUS ARTICLES

Amos Loader Makes Logging by Motor Truck More Profitable.....	172
The Weather Cock—And the Breeze.....	174
But Look at the Difference!.....	184

### DEPARTMENTS

Your Waukesha Truck Engine, Its Care, Dis- assembly and Repair.....	175
Rear Axle Repair and Adjustment—11—Torbensen Internal Gear-Driven Axle.....	178
The Better Way.....	186
The Electric Truck Speeds Up Terminal Work.....	190
New 2-Ton Case Truck for Farm Haulage.....	191
Shop Equipment, Time and Money Saved in Truck Repairs.....	192
New Accessories and Parts.....	194
Motor Truck Electric System Wiring Diagrams.....	196
The Readers' Forum.....	198
Editorial: Truck Owner Will Decide.....	202

### NEWS

Parts Service Plan Meets Opposition.....	203
Detroit to Open Its First Truck Depot.....	203
Store Door Delivery a Success.....	204
New Line Established Out of Boston.....	204

Index to Advertisers.....74-75

## The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT  
David Beecroft, Directing Editor  
Ray W. Sherman, Executive Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879.

### BRANCH OFFICES

Chicago, Mollers Building, 59 East Madison Street  
Detroit, 317 Fort Street West, Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devon-  
shire Street.

### SUBSCRIPTION RATES

United States.....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law.....	.50c
Canada.....	\$3.00 per year
Foreign Countries.....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



# "NORMA" PRECISION BALL BEARINGS

(PATENTED)

Steadiness, power, smoothness, dependability—in a car, truck, or tractor—cannot be traced back to any one part. They are a function of the coordination of all parts, in perfect performance. So small a part as the bearings of ignition apparatus or lighting generator, may destroy this coordination and impair performance. "NORMA" Precision Ball Bearings are standard on automotive units known for their sturdy reliability.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# ENSIGN

**F**OR A NUMBER OF YEARS WE specialized on Truck and Tractor Equipment for use with Distillate.

¶ Therefore we have a distinct advantage in handling the present poor fuels.

¶ The New Model "E" ENSIGN has a new Starting Control, which combined with other Basic ENSIGN principles make this The *"Carburetor that Never Fails"*.

¶ To Truck Fleet Owners, Dealers and Repairmen we will demonstrate why we can and do sell on "Guaranteed Performance".

*Full Information From Nearest Branch*

ENSIGN CARBURETOR CO  
*Makers of Carburetors for All Internal Combustion Engines*

CHICAGO  
2900 South Michigan Ave.

LOS ANGELES  
217 East 17th St.

SEATTLE  
309 East Pine St.

# CARBURETORS



# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXIV April 15, 1921 No. 6

## **Holding Your Own— And Then Some**

### *The Story of a Superintendent Who Is Both a Mechanic and an Executive!*

**H**OLDING your own—and then some! That sums up success.

But it is the “then some” that makes all the difference.

Holding your own is something. It is a good deal. But there are men everywhere in every line of industry who are doing that; who are holding down their jobs. So there is nothing startling, nothing to cause a stir in the world, in holding your own.

It is the “then some” that causes the stir in the world. It is the “then some” that will get you what you want and put you where you want to be.

And it applies to the fleet superintendent who wants to be a general manager, to the master mechanic who wants to be a superintendent, to the mechanic who wants to be a master mechanic—and so on, up and down the line.

For we are all of us ambitious. We all want to prove our worth. We all want to fill a higher position some day.

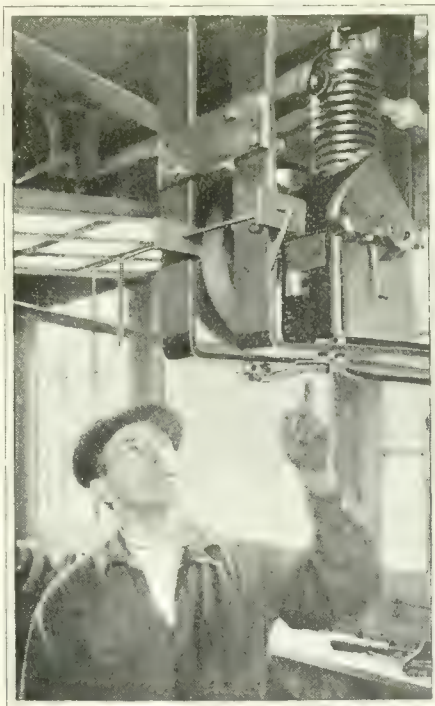
It is the “then some” that we put into our daily work that will get us there.

Holding your own is not enough. Getting the trucks out somehow; getting the repairs done somehow; buying parts and machinery some-

how, and having a good excuse ready somehow, if anything goes wrong; these are not enough.

It is the man who puts his back into his work; who puts his whole soul into his work; who thinks for the firm as for himself and guards

#### **Theodore Opdenacker**



*He is doing more. He is putting into his work the “then some”!*

the firm's interests as his own, who puts the “then some” in his work.

In Trenton, N. J., there is a big coal company, with a fleet of 15 trucks. The mechanic in charge of those trucks is a Belgian who came to this country long before the war. He is a foreigner, but he fits into his organization like a hand in a glove. He is holding his job down, but he is doing more. He is putting and has put into his work, the “then some.”

In the illustration on this page he is pointing out a pump he installed for compressing air in a tank. The air is used for cleaning parts also, but he installed it principally to supply air to an air and kerosene nozzle which he designed himself to clean the hoisting gear on the trucks.

Why? The trucks handle wet coal and cement and the hoisting gear got rusty and dirty very quickly. The gear would have worked anyway. But it was to the firm's interest to keep the gear clean. And this man kept it clean.

As Theodore Opdenacker points to his pump, he might well be saying: “There is a little of the ‘then some’ which I am putting into my work.”

Read his story on the next two pages.



# A Mechanic Who Is Also a Manager

## *Holding His Own —And Then Some*

**T**HIS is the story of Theodore Opdenacker, chief mechanic and manager of a fleet of 15 coal and cement trucks, who holds down his job and "then some."

Mr. Opdenacker would not put it that way. Because he *has* the right point of view—because he puts more into his job than he has to, to hold it down—he would not take any great credit to himself for his achievement.

Nevertheless, he is an inspiration to other men who are doing his kind of work—because he studies his job; because he uses his brains as well as his hands; because he does not buy supplies unless he needs them and then he buys them as cheaply as is consistent with efficiency, and, above all, because back of everything he does lies a consistent, unvarying effort to guard the best interests of his firm in the most efficient, most economical and most reliable way.

That is how Mr. Opdenacker adds the "then some" to holding down his job.

### The First Problem

When Theodore Opdenacker took charge of the fleet of the Tattersall Co., Trenton, N. J., a little over a year ago, he found nine Autocars engaged in delivering coal and cement for the company.

The company had already installed a quantity of machinery for repair work. There was a lathe, two floor drill presses, an arbor press, a grinder and an electric motor to supply power to operate these tools, as well as smaller tools, such as an electric hand drill, engine stands, vises, etc.

But Mr. Opdenacker soon realized that in spite of his equipment and his best efforts and those of his mechanics, if anything went wrong with a truck, the vehicle was held back from important work—was a loss to the firm—while the repairs were being made, no matter how promptly and efficiently these were done.

This was the first problem.

But it was not the propitious moment to lay in a large stock of spare units.

On the other hand, Mr. Opdenacker had heard of the unit repair system and realized that it was the solution. An adequate stock of spare units would be the only way to prevent laying off trucks during repairs. There was his problem.

He solved it. He solved it by using his head and through his determination

to give the firm the best that was possible under the circumstances.

This is the way he did it. He looked around until he found someone who had an old, second-hand Autocar to sell, and he bought it—for \$150.

Then he took the truck to pieces, put all the spare units in the best possible condition—plenty good enough condition to serve as replacement parts—and he had the spares he wanted, at a fraction of what they would have cost if he had bought them new.

It is a simple enough solution, once you think of it—but he sat down and thought of it—that is the main thing.

### Better Lubrication

Here is another example. On the Autocar there are two little holes on each cylinder, one above each valve stem guide, which are intended for oiling the guides.

But to insure that the guides should be properly lubricated, as the manufacturer intended, Mr. Opdenacker fastened an oil cup on the top of each cylinder and ran two little copper pipes from it to the oil holes. This equipment did not cost the company much, although it cost Mr. Opdenacker a good

### What Opdenacker Did

- 1—Bought spare parts economically.
- 2—Increased truck efficiency by designing one feature of lubrication himself.
- 3—Worked out a method of keeping the hoisting gears clean.
- 4—Installed apparatus to clear the truck cylinders of carbon.
- 5—Made the best of the garage layout as he found it.

### He added the "then some" to his work

deal of trouble. But it increased the efficiency of the trucks.

There is plenty of ordinary routine work for Mr. Opdenacker. He does not find time so heavy on his hands that he is obliged to think up new schemes to amuse himself. But with all the other work on his hands he makes time to improve matters, wherever a problem—or trouble—presents itself. Here is another instance.

All the trucks are equipped with power hoist dump bodies. On the bodies which the company put on the new Packards the hoisting gear is enclosed so that dirt and water cannot get at it. But on the earlier bodies with which the company had equipped the Autocars, the hoisting gear was exposed.

### How He Designed a Cleaner

The trucks are engaged in hauling coal and cement. The coal is sometimes wet and the cement bags envelop everything in fine dust. The mixture of wet coal dust and cement dust gathered on the hoisting gears of the trucks and decreased their efficiency.

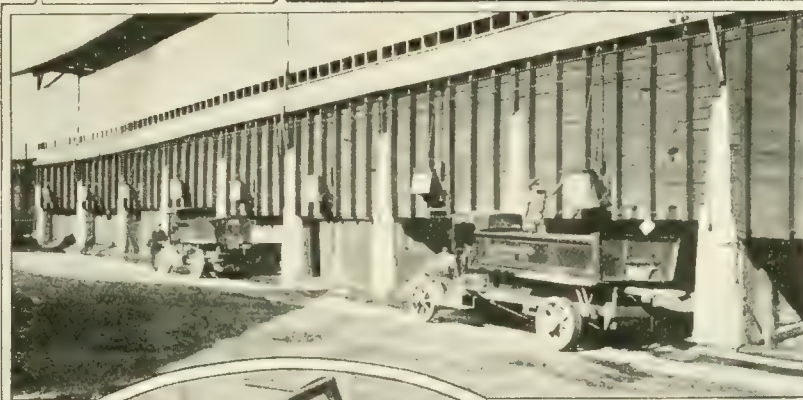


The nozzle with which Opdenacker is cleaning the hoisting gears is the patented article. But Opdenacker used a cruder version of it first

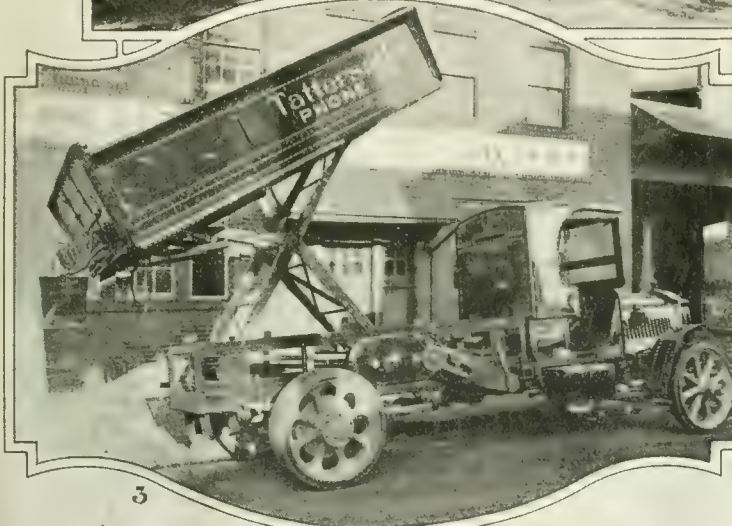
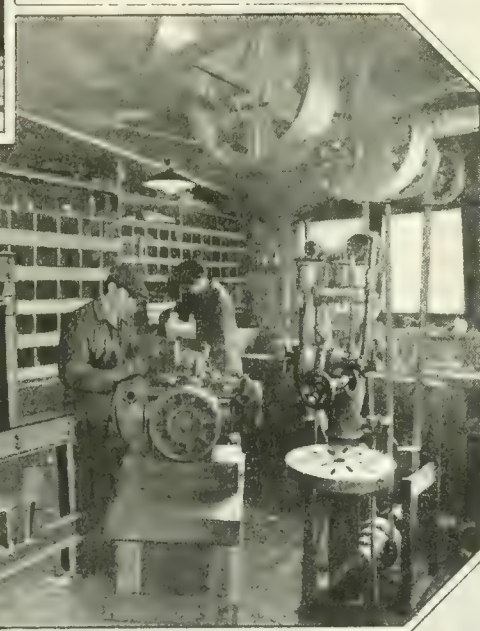




1



4



3

1—This view of the garage shows, from left to right: Spare tires, the air tank, entrance to the workshop, spare fenders, oxygen tank, spare Autocar parts, spare springs, garage bench and repair pit. 2—The coal hoppers where the trucks are loaded. The garage is on the left and the shadow of it can be seen in the picture, so there is no unloaded run. 3—One of the new trucks. 4—The repairshop, showing small parts bins, the arbor press, engine stand bench and big drill press. Note the wooden guard on the drill press belting

They would still work, but they were not so efficient when clogged in this way.

So Mr. Opdenacker worked out a method for cleaning these hoisting gears in the shortest possible time.

He installed an air pump which took its power from the motor which drove the repairshop machinery. He installed a big air tank and connected it with the pump. And he designed a suction nozzle through which the air should pass and pick up kerosene and blow it with great force against the gears.

It is a simple apparatus, and it is patented now. In fact, Mr. Opdenacker found that the patented nozzle was bet-

ter than his own, so he bought one. But he cleaned those gears, before he ever heard of the patented nozzle—and he cleaned them quickly and efficiently, without holding up the trucks.

Here are two more instances, selected at random out of many. Mr. Opdenacker realized that carbon in the cylinders was decreasing the efficiency of the trucks. So he cast about and finally arranged for an oxygen tank to be installed at a cost of \$5 per month. With this oxygen is blown into the cylinders, the oxygen is lit and the carbon burned out. His recommendations for this apparatus was listened to, because the firm knew that he had its interests at heart.

Again, he found the garage a one-story affair, without pillars, but with few windows and no skylights. Most of the repair work was done in a little room off the garage, but enough was done in the garage itself to make light important. So again he persuaded the company to allow him to cut skylights in the roof, and he improved the efficiency of the garage about 50 per cent.

These may seem like trivial details. But they were solutions of real problems—and little things show which way the wind blows. Moreover, Mr. Opdenacker was able to solve his problems as they came up because he put the "then some" into his daily work.



# Amos Mechanical Loader Makes Logging by Motor Truck More Profitable

*Enables One Man to Load 1,500 Ft. of Logs in 20 Min.  
—Device Also Expedites Loading of Logs on Trailers*

**S**AW mill owners, long at the mercy of slow methods and excessive expense in the haulage of heavy timber to the mills, may now install a loading device that will enable one man to load 1500 ft. of logs in 20 min. The Amos loader, as it is called, was invented by practical lumbermen who were among the first to put motor trucks into use for hauling logs. Though motor trucks helped to speed up deliveries to the mills of the Amos Lumber Co., Edinburg, Ind., still they did not measure up to their full efficiency on account of the delay in getting them loaded. Because of necessity, the company invented a device that has resulted in saving much time and money.

This loader is moderately simple in construction, being driven from the truck propeller shaft, power take-off or jack-shaft by a disk clutch, which drives through a phosphor-bronze worm gear, a winding drum mounted on either side and underneath the bolsters of the truck. This gear is equipped with end thrust ball bearings, thus reducing the loss of power in transmission to a minimum. The clutch is engaged or disengaged by the operator through a pedal mounted at a convenient place on either footboard. The worm gear holds the log or object which is being loaded in whatever position is desired by the operator and he is free at all times to stop the loader and make an inspection or shift the truck as required to make the log load properly. To prevent wear and reduce friction, the worm gear is housed and runs in oil.

The Amos log loader makes a complete log-hauling outfit with the truck chassis alone, as it consists of bolster blocks, four 6-in. I-beam bolsters, chains and loading machinery. The loader is mounted beneath the bolsters so as to be entirely out of the way for loading logs or rolling them off on either side.

By sending a blueprint or factory number of the truck to the Amos company, it can provide the attachments required to enable any average mechanic to equip the truck with the loader. Instructions for installing are sent with each device. The loader can be sent direct to the truck factory for attachment when a new vehicle is being purchased. The Amos loader is made to be installed on any truck of 2-ton capacity and over. The cost of the apparatus for any size of truck is \$580, f.o.b. Edinburg, Ind. When a loader is

shipped, instructions are sent with it in the form of a drawing and any good mechanic is able to make this installation by the use of this drawing.

If a fleet owner in Georgia wants to purchase one of the loaders, he could order it from the Amos company direct and it would ship the loader with full instructions for installing. If his order is large enough, not less than three loaders, the Amos company will make the installation free of charge. Where a man is sent to make the installation of one loader, a charge is made for his time and expenses.

When the logs are loaded, the loader binds them in the use of double chains, so that the logs do not need to be fastened otherwise.

With all of these features; the Amos log loader enables a motor truck to give

full-measure service; it replaces high-price labor and slow horses.

Timber heretofore inaccessible or too far distant for present hauling methods need no longer be neglected as too expensive to remove. One reads much these days of the diminishing supply of standing timber and the like, but there are literally hundreds of millions of feet growing in small lots scattered here and there throughout even the oldest settled regions of the United States. The great problem is to secure this timber and transport it to mills at a cost that is reasonable. In the old days, particularly in the New England states and throughout the great hardwood producing sections, many of the choice stands of timber were left because the method of hauling during that period prevented this timber from being logged at a rea-



*Top—One man loading a heavy log on a trailer through the use of the Amos loader. Bottom—All ready for the trip back to the saw mill. This view shows the method of securing the logs to the truck by tightening the chain on the winding drum*



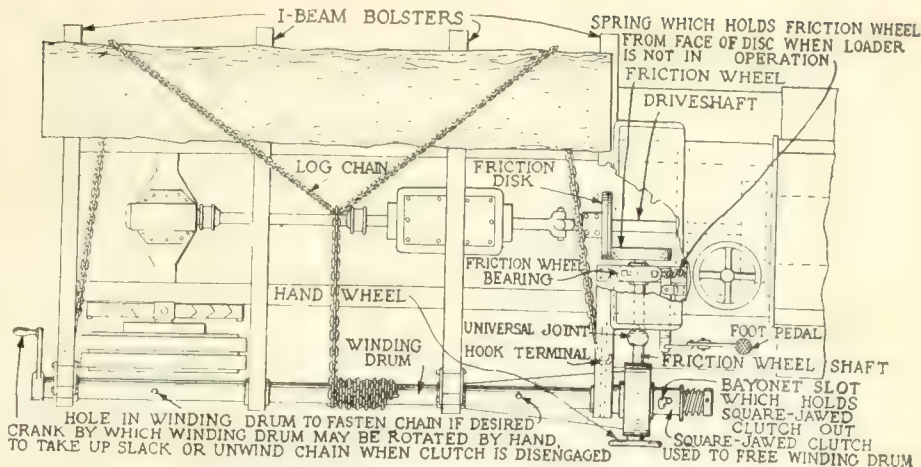
sonable cost. Then came the motor truck which partly solved the problem. When a suitable trailer was developed, further advancement was realized, but it still remained a difficult and expensive proposition, because loading logs by hand was slow and hard work. Labor was scarce and high priced and horses were impractical for the simple reason that it was impossible for a team to go 50 miles in one direction in 1 day and 40 miles in another the next day.

The Amos loader has brought the truck and trailer to the highest point of efficiency in the lumber business by entirely eliminating the objectionable features above mentioned.

It is just as efficient in loading the trailer as the truck proper. In loading the trailer, the trailer is drawn parallel to the truck and between the truck and the logs to be loaded. The chain is then extended over the trailer and around the log which is to be rolled up the skidway onto the trailer.

Users of these loaders have found them efficient for many things other than merely loading logs, such as pulling other trucks and trailers out of tight places, loading boilers and heavy machinery, safes, loading logs on cars, shifting cars and many other uses.

A good example of the efficiency of this



*Layout of the Amos log loader, showing how it is attached to the truck frame and the method of its operation*

device may be taken in the experience of the Amos Lumber Co. That company was taking logs direct from the woods to its mill, a distance of 34 miles, and the trip was made in 9 hrs. Only one man was required to do the work. In this particular instance it would have cost at least \$2 per 100 ft. to haul the logs to the freight cars, load them and pay the freight to the mill. The com-

pany was able to haul on the average of 2,500 ft. of logs per day from this tract of timber. It would have cost at least \$50 per day with any other means of transportation to move this footage of logs. In addition, these logs were delivered at the yard in considerably less time than that which would have been consumed in putting them on cars at shipping stations by the old method.

## New Type of Elevating Dump Body Designed by Federal

**T**HERE are many conditions which make it necessary for a load of coal to be elevated to an extreme height in order to gravitate the coal into a bin, manhole, or over a sidewalk, into a shed, or into a coal car on track. The new type of elevating dump body designed by the Federal Motor Truck Co., Detroit, incorporates a number of features which are entirely new in connection with power dumping bodies. The dumping of coal directly into coal cars is one of the uses to which this body may be put.

The Federal body is elevated by a standard hydraulic hoist which is simple in operation and practical in actual service. The dump body is very much like an ordinary body, having two dumping positions, the elevated position which raises the lower end of the body 6 ft. above the ground, and the ordinary dumping position. There is a flat sliding bagging chute door in the tailgate with an 18-ft. telescoping chute carried in a cradle under the body.

The body is elevated into dumping position by the hydraulic hoist, which is controlled from the driver's seat in the usual way. The release hooks are engaged, as indicated by the hand lever resting in the forward position. To illustrate the method of operation, grasp a lead pencil between the thumb and forefinger of the left hand, at a distance of about one-third from one end, and hold in a horizontal position. With the other hand, press down on the short end. If an object representing the dump body were on the long end of the pencil, it would, of course, be elevated. The thumb and forefinger of the left hand represent the

pivot shaft of the main elevating lever, which is supported by the elevating frame. The forefinger of the right hand pressing down on the short end of the pencil represents the pull rods pulling down on the lower end of the main elevating lever.

If it is desired to dump without elevating—that is, in the ordinary position—the release hook lever is thrown toward the rear, thereby releasing the pull rods. The body, resting on the elevating frame, is raised at the front end only.

The Model D-10 body has an 80 cu. ft. capacity and is designed for a 2-ton chassis. Smaller bodies for carrying materials other than soft coal may also be had. The total weight is 2950 lb. This includes 1200 lb. for the body; 550 lb. for the hoist, and 1200 lb. for the elevating mechanism, chutes, etc.

The foregoing outfit complete costs \$1,250. An extra charge of \$100 is made for the painting of the body and chassis. A 6-ft. short chute for dumping into coal shed windows, hoppers, etc., costs \$15.



*Shoveling of coal into a car is eliminated with the Federal dump body*



# The Weathercock —And the Breeze

Old Hammerhead Talks About  
Sticking to the Job You Know

By SINCLAIR GLUCK

AS a rule his men found a genial smile and a warm sense of personal interest waiting for them, when they found their way into the private office of old Silas Gunther, president of the town's biggest commercial house. For there was a real affection back of these little talks with Old Hammerhead, as the men called him.

But this morning the old man was frowning a little and the young driver whom he had sent for found that the bravado with which he had entered the office was gradually sinking into his boots. The young fellow sat on the edge of his chair and stared anywhere but at Old Hammerhead.

Finally the old man turned away from his mail and faced him, his eyes steely and his lips set in grim lines. Perhaps there was a smile back of them, but the driver did not see it.

"Well, Jackson, I hear you're going to leave us. Is that right?"

The driver swallowed and cleared his throat. "Why—why, yes, sir. I—"

Old Hammerhead nodded briefly. "I'm sorry to hear it, Jackson."

"Thank you, sir. I—"

"But of course if you've found a better job, I wouldn't like to stand in your light," Old Hammerhead continued. "However, there's one thing I'd like to have you tell me. For if there's any man in town who treats his drivers better than I do, I want to know it. I'd like to know where you're going?"

The young driver squirmed in his chair and cleared his throat again. "I'm— I'm giving up driving, sir."

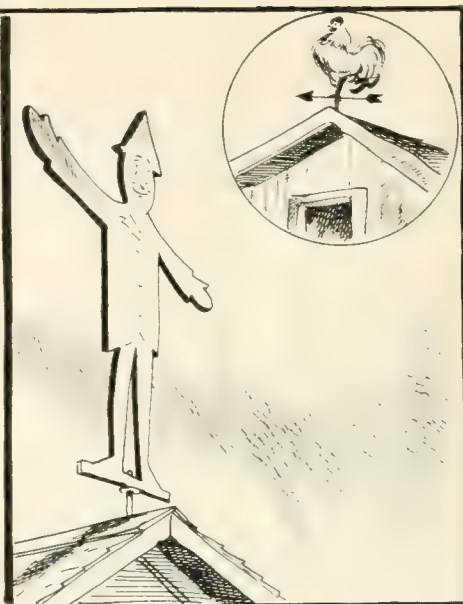
The old man's eyebrows went up. "Giving up driving? Why you're a good driver, Jackson. Are you going in for mechanics?"

"No, sir. You see I have a friend who wants me to go into business with him. He seems to think we could make a go of it."

"Going to buy a truck, Jackson? That sounds like a pretty good proposition."

"No, sir. You see this—friend of mine—. He's a stock broker—and—he wants a young fellow to drum up business. So—he seems to think—"

Old Hammerhead leaned back in his chair and smiled for the first time. "Bucket shop, Eh? But you're a



driver, Jackson! You're a *good* driver!" He tapped the desk with his finger, "You're not a broker!"

Jackson started to speak but the old man held up his hand. "You're a producer now; not a man who dabbles in the labor and production of other men. You're doing something worth while. You're helping—not hindering—the growth of the nation."

"Look here, Jackson! Do you remember young Charlie Clines? He was a producer, once. He used to work on a farm. Then he came to town and went into a broker's office. Like most of the young ones, he dabbled himself. Do you know where he is now? In Sing Sing."

"He wanted to get rich quick, that was all. He wasn't a bad fellow. But they caught him short and he borrowed a little of the firm's money to tide him over—and they caught him."

## He Looked Foolish

The old man leaned back in his chair and glanced out of the window. "You know, Jackson, there are certain bugs that are a good deal like people. Take the ants and the bees. They work and produce something, even if it's only for their own kind."

"Then there are the flies. They don't do anything much. They live along on the wealth that nature left them as a heritage. And finally there are the spiders. They live off the flies. They lure the foolish flies into their webs and finish them. But they don't catch any bees or ants. Which would you rather be, Jackson, a bee or a spider?"

"But I'm not going to gamble, sir!" the young fellow broke in.

"I hope not, Jackson. But speaking of foolish, let me tell you a little story. Last summer I went way up in Maine for my vacation. I found an old farm up there, where I could get plenty of plain good food and where I could lie around and drink in the sunshine and just plain rest."

"I used to go out and lie in the hammock under the trees. And one day

something on top of the barn caught my eye. It was a big, gold rooster and it fairly shone in the sun."

"He was staring off toward the west, Jackson, out of those fierce little eyes of his. Had a determined look on his face and in his whole pose. Looked like any minute he was going to flap his wings once and then start off in a bee line for that distant point."

"It was a quiet day, Jackson, and there was hardly a breath of air stirring. But by and by, while I was staring at him, there came a little breeze across the fields, full of clover and the drowsy hum of bees. Well, that old rooster gave a kind of creak and when I looked again he was staring off due south and looking just as determined to get there as ever. And a minute later he was looking due east just as eagerly."

"Well, sir, I just burst out laughing. You see, as long as he was staring off in one direction there was something kind of dignified about him. But the minute he began staring in another direction—why—he just looked foolish."

"Now, Jackson, he was just a weathercock. He was put there to point which way the wind blows and I was wrong to laugh at him for doing it."

"But you and I aren't weathercocks, Jackson. And it isn't our job to fix our attention in one direction and then switch to something else."

"For example, Jackson, don't you think if a man has made a good driver of himself and is respected and liked and is doing well in his work, that he's kind of foolish to switch to something that he doesn't know much about?"

"Well, sir, I—"

"Wouldn't you rather be a good driver than a poor broker? Wouldn't you rather be a real worker than a weathercock? How about sticking to the work you know, Jackson?"

The young driver's face was working queerly. Suddenly he leaned forward in his chair. "I know you—and I know this work," he said, "and, by gad, I'll stay with you, sir!"



# Your Waukesha Truck Engine

## Its Care, Disassembly and Repair

**T**HE most essential thing for the welfare of any engine is oil. If plenty of good oil is used in any engine the larger percentage of all engine troubles will be eliminated; for lack of oil or poor oil is responsible for most engine troubles. In the care and operation of the Waukesha engine, in fact any type of engine, precedence should be given to the question of lubrication.

The oil in the Waukesha engine is pumped from the crankcase through oil lines into the main bearings and from these through a hollow shaft into the connecting rod bearings, thus insuring positive lubrication as long as sufficient oil remains in the crankcase. The pistons and cylinder walls are lubricated by oil thrown from the lower end of the connecting rods. The flow of oil is regulated by the pressure regulating valve on the right side of the engine near the front end. There is a continuous flow of oil at all times when the engine is running. After the oil reaches the bearings and timing gears it drains back into the oil pan; thus at all times keeping the oil pump supplied with oil which is again pumped through the oil lines to bearings and gears, and again into the oil pan.

A combined oil filler and breather is provided near the front of all Waukesha engines. This breather is provided with a screen for filtering the oil. Do not remove the screen. The breather also serves to relieve the crankcase compression, and should never be plugged shut. The oil screen at the rear of the engine should be removed and thoroughly cleaned at least every 30 days. It is not necessary to remove the oil pan to remove the screen; merely remove the round stamping on the bottom of the oil pan (after draining out the oil through the drain cock) and remove the nut holding the screen in place. Wash the screen in gasoline free of lint and dirt, and replace. See that the gasket on the stamping is not torn or crumpled before attaching stamping to pan, and that there is no oil leak at this point when the engine has been refilled.

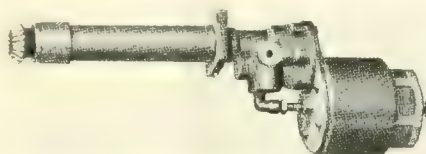
No matter what grade of oil you use, the crankcase should be drained at least every 10 days, and preferably every week. Letting the engine idle is very bad for the oil, as 15 min. of idling will dilute the oil more than 4 or 5 hr. steady pulling. Stopping the engine by pulling out the dash control is bad practice, as it floods the cylinders with gasoline, which in turn thins the oil. Always keep the oil above the one-half full mark on the bayonet gage. It must be remembered

also that the light or medium oil which is best for winter use is not satisfactory for summer use, as in warm weather oil thins out much more readily than in cold weather—thus a heavier grade of oil should be used during the summer months than that used during the winter.

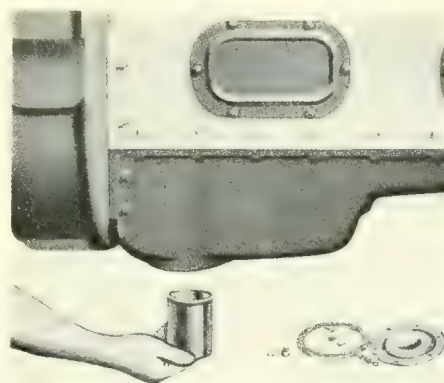
### Replacing Main Bearings

In order to replace the main bearings, proceed as follows:

1—If upper or case half of main bearings is to be renewed, take the engine out of the chassis and before removing



*Oil pump on Waukesha EU engine*



*This oil screen should be removed and cleaned at least every 30 days*

the oil pan drain off all the oil. If the lower or cap half only is to be renewed it will be necessary to remove the oil pan only.

2—Take out all spark plugs, priming cups, etc., on top of cylinders. Now stand engine on its head and place props under the engine arms to keep it from wobbling while work is being done, or if a couple of heavy horses or a low bench is available the work may be done with the engine resting on the manifold side.

3—Take out all pistons and be sure that they are all marked so they will be put back into their respective places, also that each rod will be put back with the same face toward the front of the engine, and not turned half way around. Remove the gear case cover, first taking off the starting crank bracket and the

starting pin from front end of the crankshaft.

It is important before removing the crankshaft to look at the marking on the gears, so that when it is replaced the marks on the gears will line up.

If it is desired to renew the bearing in the cap half only, it will not be necessary to remove the crankshaft, but if both halves are to be renewed the crankshaft must, of course, be removed. In the latter case the flywheel must be removed, and in EU, FU, CU, DU model engines the filler block back of the rear main bearing, shown in the accompanying illustration.

The filler block is removed by taking out the two filler head cap screws B, which bolt the filler block to the upper oil retainer, and two short cap screws (not shown) which bolt the filler block to the rear end of the crankcase. In replacing the filler block be careful to see that two small gaskets between the upper oil retainer and filler block are in proper position, also the gasket that fits between the filler block and the end of the crankcase. One hole in the flywheel and crankshaft flange is offset so that the flywheel can be reassembled to the shaft in its proper position.

4—Take off the three main bearing caps and remove the crankshaft. Stand the latter up on end and place it safely aside, as a fall might spring it out of shape and later you would wonder why the bearings could not be fitted.

Take out the screws to remove the damaged bearing. Clean away all dirt and grit with gasoline; fit in one-half of the new bearing in the crankcase.

After the bearing has been fitted in the crankcase, replace the crankshaft. Apply Prussian blue, or red lead, to the crankshaft bearing surface and scrape off the spottings in the same way as in fitting new connecting rod bearings. Strict attention must be paid that the new bearing does not rest too high in the case so as to throw the other two bearings out of line, nor should the bearing be too low.

Should either the front, center or rear bearing be too high, the bearing or bearings that are high must be scraped until the three bearings are in correct alignment.

The crankshaft must fit the half of the main bearings in the crankcase perfectly before you proceed to fit the caps.

Always fit the rear main bearing cap first and tighten it up as much as possible. The rear bearing keeps the shaft from moving endwise and should be fitted so as to have from .006 to .008 in. total clearance between the thrust collar and



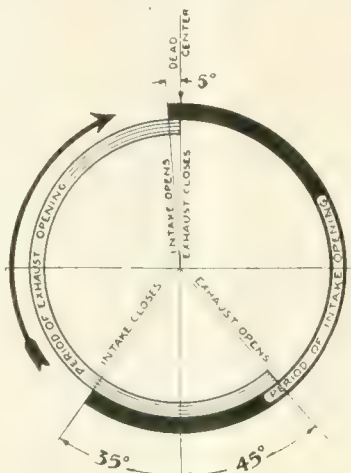
face of bearings. When the bearing has been properly fitted, the crankshaft will permit moving with one hand on the starting crank. If the shaft cannot be turned with one hand on a 12 or 15-in. radius, the contact between the bearing surfaces is evidently too close, and the cap requires shimming. On the other hand, if the crankshaft moves too easily, remove one thin shim on each side and try fit of bearing on shaft as before.

After removing the cap observe whether the blue "spottings" indicate that the bearing is in contact with the shaft over its entire surface. If they do not, the bearing will have to be scraped, bringing as much of the surface of the bearing in contact with the shaft as possible. Back off the nuts on the rear main bearing a turn or two and proceed to adjust the center bearing in the same manner. Repeat this operation with the front bearing, with the other two bearings loosened. When tightening the nuts on either the rod or main bearings never tighten down two bolts on the same side, but always tighten one bolt, then cross over and tighten one on the opposite corner. After having tightened four nuts lightly, then go around a second time and bring all four down to their final tension. Don't tighten any one nut first and then proceed with the other three.

When the proper results have been obtained with the bearings replace the idler gear and be sure that the markings on the gears correspond as shown in the accompanying illustration. You can now replace the caps and insert the cotter pins, or wire. Be sure when you replace the pistons that the heads and the rings are free from grit and carbon and spaced so that the ring gaps do not come in line with one another; also oil each piston ring carefully.

Before replacing the oil pan be sure that all nuts have been carefully tight-

ened and cotter pins inserted, and that any oil lines that may have been disconnected in fitting main bearings are reassembled properly. When replacing the oil pan always tighten the bolts that hold the pan to the crankcase before inserting the bolts that attach the oil pan to the bell housing. If the latter are tightened first the pan cannot be drawn up firmly to the crankcase and will leak.



Valve timing diagram on models EU, DU, CU, FU Waukesha engines

Run the engine light for at least  $\frac{1}{2}$  hr. before applying load and be sure and check up the oil pressure.

### Removing Gear Cover

To get at the timing gears, which are in the gear case at the front end of the engine, it is first necessary to drain the water from the radiator and cylinders. It will then be necessary to remove the bolts or cap screws which hold the radiator and to loosen the hose clamps. After this has been done, the radiator is

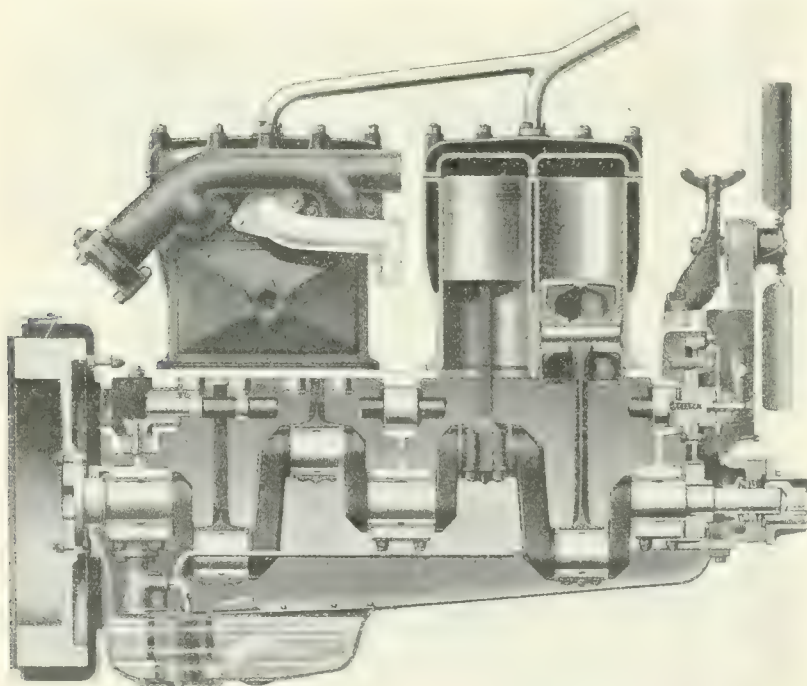
ready to be lifted from the chassis. Next remove the fan by removing the nut which holds the fan bolt to the bracket and then remove the fan pulley. To remove the latter, loosen the clamp screw in the hub and pry the pulley from the shaft, being sure to remove the Woodruff key which keeps pulley from turning on the shaft.

Next remove the starting crank housing by removing the cap screws. Remove the starting crankpin in shaft. As the pin fits tight in the shaft it will be necessary to use a light hammer and punch in removing the pin.

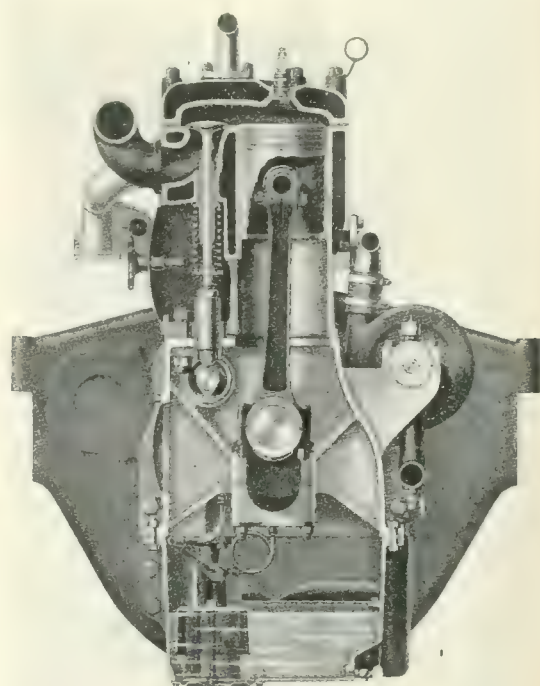
As the front engine support is a part of the gear case cover, it will be necessary to have the front of the engine securely blocked before proceeding further, for if the cap screws are removed from the gear case cover and engine is held only by the rear brackets there is apt to be serious damage done to the rear supports. Be very careful that the front of the engine is securely blocked until the gear case cover and front hanger are again bolted in place.

Remove the cover from the governor housing plate by removing all of the  $\frac{1}{4}$ -in. cap screws which hold the governor housing in place. To remove the governor control rod G, Fig. 1, from the governor arm E, remove the small key which holds the ball socket until it can be removed from the ball on the governor arm. After the ball and socket joints have been taken apart see that the socket screw is turned back into the socket to prevent the loss of the interior parts of the joint.

After this is done remove all bolts which hold the gear case cover on to the crankcase and remove cover. At the upper left-hand corner and at the lower right-hand corner you will find two large dowel pins which are used for lining up the gear case cover. In replacing the



Side view of Waukesha model EU engine



End view of Waukesha engine



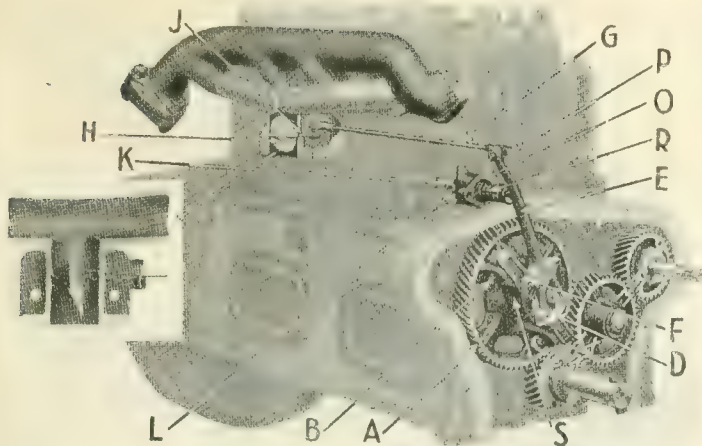


Fig. 1—Governor adjustments on the Waukesha engine and timing gears

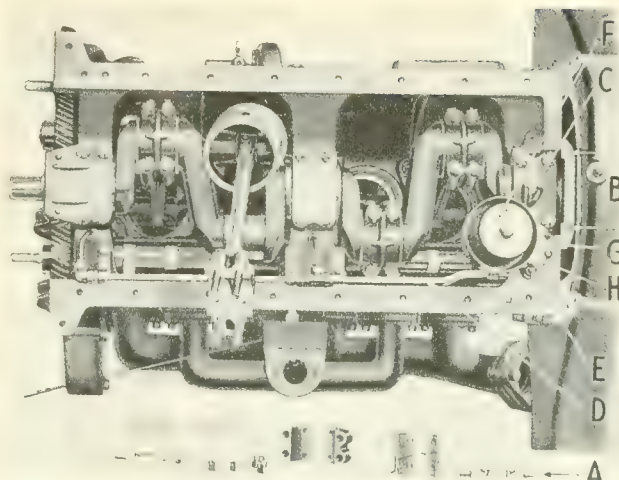


Fig. 2—Method of removing pistons. Note location of oil pump screen at F

cover be sure and drive these dowel pins firmly into place before tightening the bolts which hold the cover in place.

### Removing Timing Gears

To remove the idler gear:

Remove cotter pin and then idler gear washer. Use a slight pry in order to slip gear from stud, being careful not to put strain against the gear teeth as this is apt to damage them. It is best to pry on two opposite sides of gear so that there will be no chance of springing the idler gear stud.

To remove the camshaft gear:

Remove the cotter pins in the four bolts and nuts. Remove the nuts from the bolts and the gear may then be removed from the shaft, if necessary, using the same means as in removing idler gear.

To remove the water pump shaft and magneto gear:

On the water pump shaft you will find a large nut which is held in place by a locking device, the construction of same being such that at two or three places it is bent over sides of the nut to prevent the nut from loosening. To remove the nut, pry the bent sides of lock away from the nut and use a large wrench suitable for removing. Remember, the threads on the nut and on the shaft are left-hand threads, so in removing this nut turn to the right the same as in tightening an ordinary nut. As this gear fits snugly on the shaft it will possibly be necessary to use an improvised gear puller in removing the gear. In this gear you will find two holes which have been tapped to accommodate  $\frac{3}{8}$ -in. by sixteen-thread standard cap screws to permit the use of a gear puller.

To remove the crankshaft gear:

The crankshaft gear is secured on the crankshaft with a pin through the gear and shaft and is prevented from turning on the shaft by the use of a Woodruff key, in the same manner in which the water pump shaft gear is held. As this gear is pressed onto the crankshaft it will be necessary to have a gear puller to remove same. If shaft has been removed from the engine the gear may

be thoroughly warmed by use of a blowtorch, making it much easier to remove gear, as the expansion will have a tendency to increase the size of the hole in the gear. Do not use a torch with the shaft in place in the engine as there would be serious danger of melting the babbitt in the front bearing.

### Removing Oil Pump

If at any time it becomes necessary to remove the oil pump for cleaning or repairing, it will first be necessary to remove the oil pan. To remove the oil pump it is first necessary to disconnect the oil lines, C and D, shown in Fig. 2, and then remove the nuts E which hold

See that the shims between the oil pump flange and crankcase are not misplaced but are assembled in their proper place.

### Valve Guides

The valve guides are pressed in place in the cylinders. They may be driven out and replaced when worn, driving them from the top end. When replacing valve guides the cylinders should be removed, as it is quite difficult to drive the guides in place with the cylinders assembled to the crankcase. The valves should be reseated after new guides are installed, and care should be taken to see that the valves slide freely in the guides.

### Piston Pin Bushings

The best way to remove piston pin bushings is with an arbor press. This work can be accomplished in a few minutes. After the bushing has been replaced, it will be necessary to drill a hole through the bushing to oil the piston pin. A groove should be cut in the bushing in line with the hole, as you will note in the old bushing. These bushings will then have to be reamed so that the pistons will fit properly. The pin should fit in the bushings so that there is no side play whatever, but at the same time it should be loose enough so that you can stick your finger in the piston pin and revolve it easily when the pin is in proper place through both bushings. When the engine warms up, the bushing and pins expand, so that if you get them too tight they will stick and hold the piston in one position and score the cylinder. An expansion reamer is the best tool to use in reaming these bushings. If this cannot be had, you can use a standard reamer—taking care not to run the reamer clear through unless it is necessary. The best way is to run the reamer through on one side until the end of reamer enters into the opposite side about  $\frac{1}{2}$  in. Then ream from the other side until the piston pin will fit. This depends entirely on the taper of your reamer. If you have no reamer at all it will be necessary to scrape the bushing holes with a small bearing scraper

(Continued on page 181)

### Service on Parts!

It is your right—

To demand the following:

- 1—Quality, trade-marked truck spare parts.
- 2—Prompt and unfailing merchandising and delivery of parts.
- 3—Reasonable prices on parts, which shall be uniform to all.
- 4—Parts price lists on file in the owner's office and in the office where he buys parts.

(See Editorial—Page 202.)

### It Will Mean Better Business All Round

the pump onto the crankcase and pump may then be lifted out.

Before removing the oil pump it may be advisable to remove only the oil screen, F, and guard G, and oil pump gear cover, H, for any necessary inspection, for if you are experiencing trouble with the oil pump it may not be necessary to remove the pump entirely from the engine. In disassembling and assembling the oil pump be very careful not to injure the joints or oil line connections, for if the joints or connections are not fitted perfectly there will be an oil leak which may cause serious damage to the bearings, etc.

# Rear Axle Repair and Adjustment

*A Series of Articles to Assist Maintenance Superintendents in Carrying on Axle Repairs*

## II—Torbensen Internal Gear-Driven Axle

THE axles of a truck are considered by many its most important and its most neglected units. The reason for the neglect is obvious. Their close proximity to the road make them targets for dirt and water, and naturally when a driver finds something wrong with his axles, he will not attend to it until it actually interferes with the operation of his truck.

The purpose of the following is to familiarize the maintenance man with the Torbensen axles, and to point out that careful attention to the axle while in the garage will prolong its life and render it unnecessary for the driver or mechanic to get under the truck under adverse conditions, and where inattention at such times may cause a great deal of damage.

The Torbensen rear axles are so designed that the differential and the differential carrier may be removed from the back of the axle. Removal of the cover plate permits inspection of the differential unit without disturbing any other part of the axle.

The construction of Torbensen axles is such that when repairs are needed it is desirable in the case of a few of the major parts to have this done by the manufacturer.

Axles having the brake carriers riveted to the I-beam should be sent to the factory for repair when new carriers are

### Axles Described in Previous Issues

*Maintenance superintendents who wish to refer to articles on axles that have already been described will find them in the following issues:*

1920

1—Timken.....Nov. 1

2—Clark.....Nov. 15

3—Packard.....Dec. 1

4—Wisconsin...Dec. 15

1921

5—Ford (Bevel)

Jan. 15

6—Ford (Worm)

Feb. 1

7—Sheldon....Feb. 15

8—Walker....March 1

9—Schacht...March 15

10—F. W. D...April 1

11—Torbensen

*This Issue*

required, as these are riveted onto the I-beam by means of special alignment fixtures.

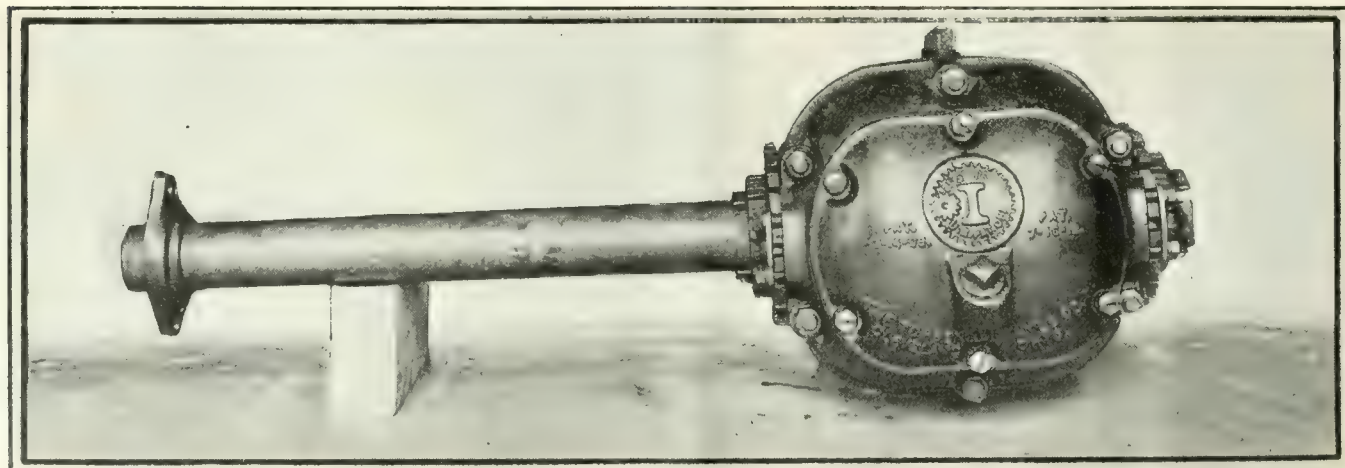
All replacements of internal gears should be made by manufacturer unless the repair shop is equipped for properly pressing the gear onto the hub and riveting it on. Do not hot-rivet as the shrinkage in cooling will leave a clearance between the rivet and the hole and this will allow the gear to work loose.

All differential carriers should be replaced as a unit, that is, the front and rear half together.

Spindles in the I-beam should be replaced by manufacturers only, as accuracy in alignment requires special equipment, and unless properly done will permit the spindles to loosen, or the misalignment may cause power transmitting parts to wear too quickly.

When inserting new bearing cups in hubs—whether straight or tapered roller type—do this on a press and never with a hammer. The same is true of cones where a press fit is required, such as on differentials, jackshafts, and pinion shaft rear bearings.

Where new gears are needed—whether bevel or spur—it is usually well to replace the set complete depending, of course, upon the amount of wear. This must of necessity be left to the judgment of the repairman, but it is not economical to run a new gear or pinion where the mate is considerably worn, as soon the new one will lose its proper tooth contour and will soon be ruined.



*Torbensen rear axle assembly from the rear showing the filler plug and differential housing*



The method of removing the wheels is as follows:

- 1—Jack up axle.
- 2—Remove hub cap screws and cap.
- 8—Remove cotter pin in outer spindle nut.
- 4—Unscrew slotted nut.
- 5—Remove locking washer.
- 6—Unscrew adjusting nut with a spanner wrench by inserting a rod in holes on

remove felt retainer in the  $\frac{3}{4}$ -ton hub, remove with chisel the three or four points where the edge of the hub has been peened over the retainer. Then pull retainer out, which will permit removal of bearing cone and cup.

### Relining of Brakes

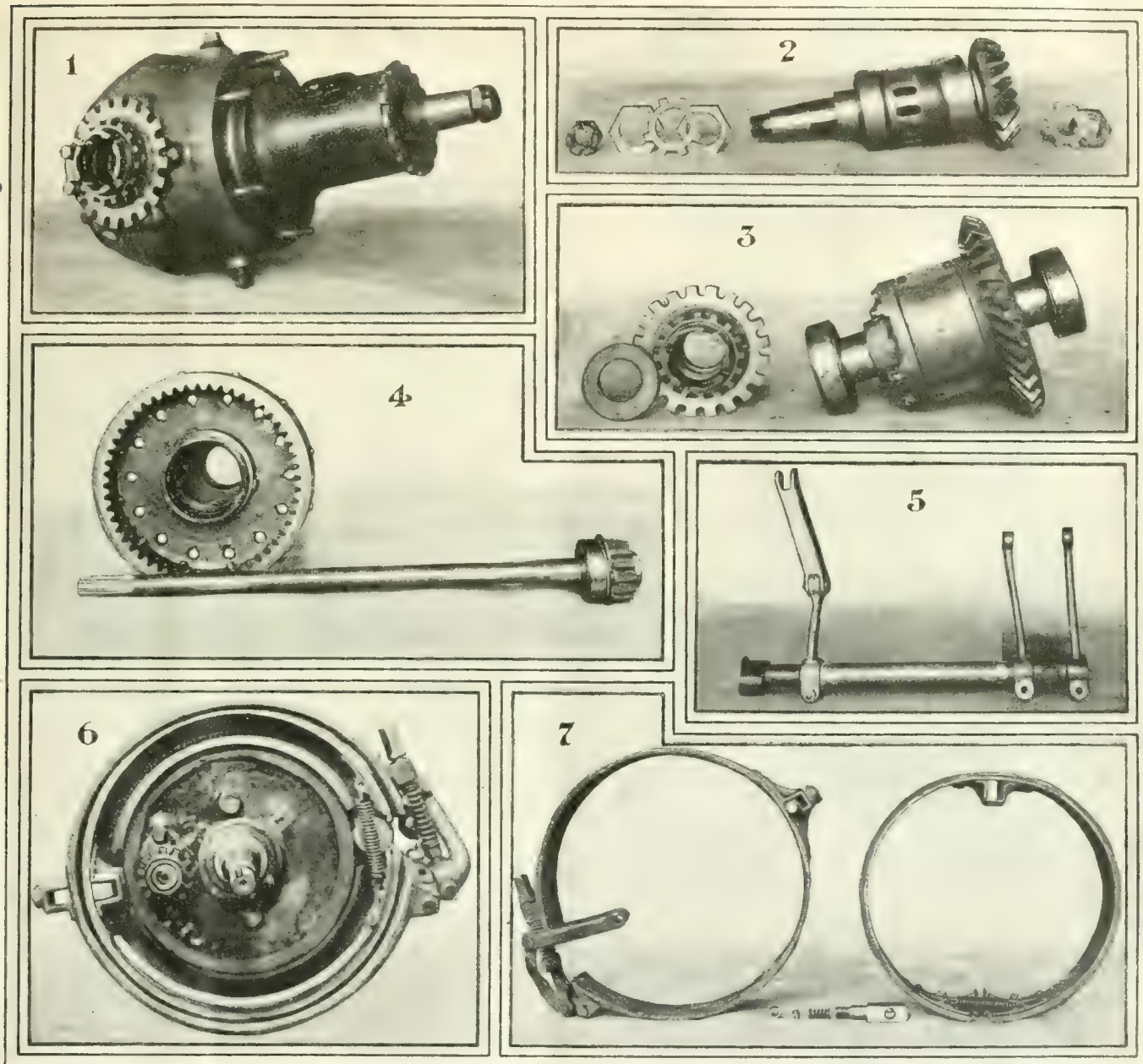
For sizes of lining used on the various models, see list below:

ful to maintain the band round or it will interfere seriously with subsequent adjustments when brakes are remounted.

To remove the brake bands from the axles proceed as follows:

External—Disconnect linkage from contracting lever. Remove cotter pin collar and spring in steady pin of anchor at rear of band. Unscrew steady pin. Remove nut from eye bolt which guides

## What the Torbensen Rear Axle Units Look Like When Disassembled



1. Differential and pinion bearing housings. 2. Pinion gear assembly with adjustments. 3. Bevel gear and differential bearing adjuster. 4. Internal gear, jackshaft pinion and driveshaft. 5. Brake levers and assembly. 6. Brake assembly and tension rod. 7. Internal and external brake bands

outside surface of nut.

7—Remove wheel. The bearings are a slip fit on the spindle and the outer cone only will come off with the wheel. Two kinds of bearings are used—straight and tapered roller.

On the  $\frac{3}{4}$ -ton axle the inner bearing cone will come off with the wheel. To

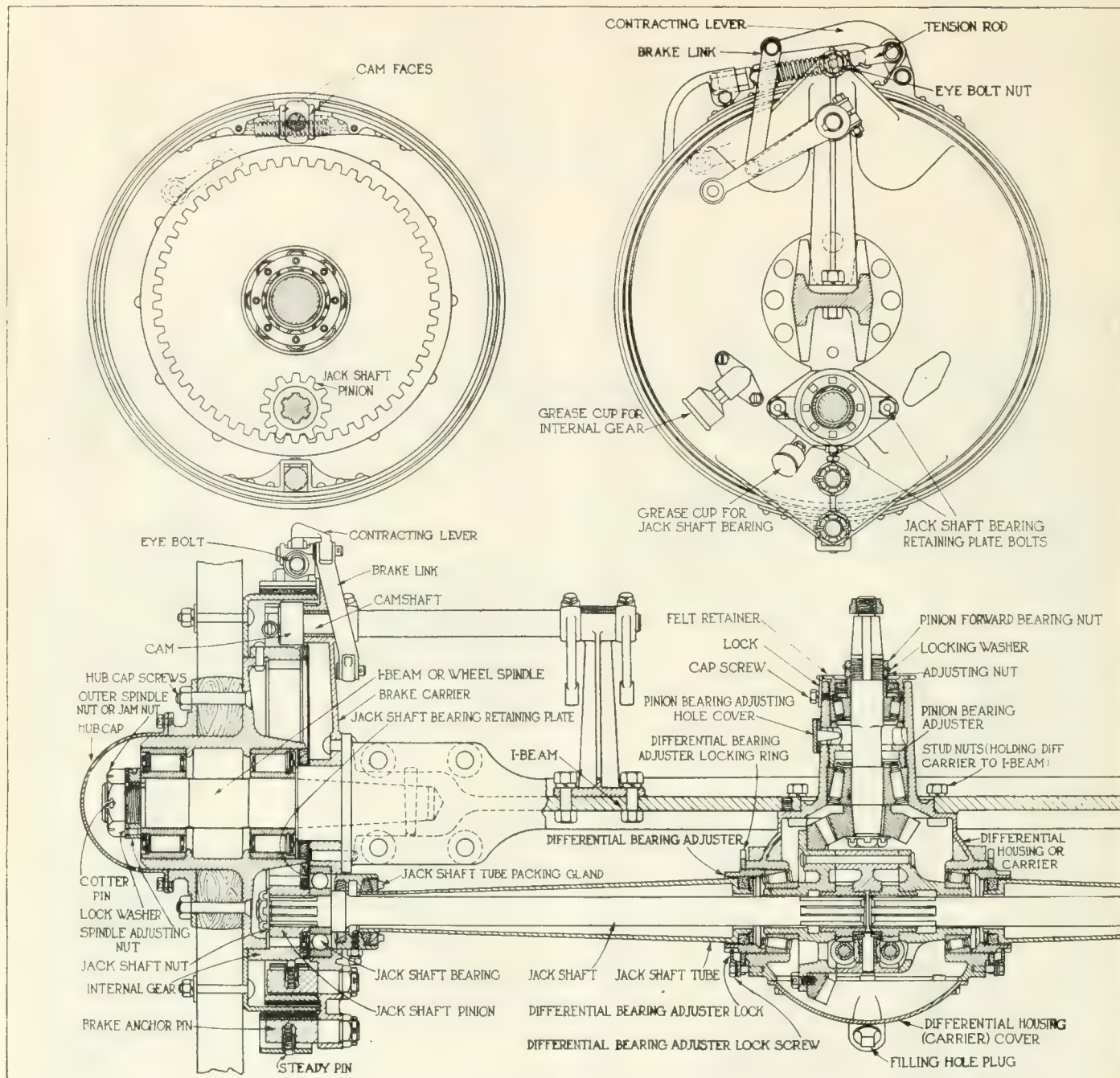
$\frac{3}{4}$ -ton ext.	$22 \times 2 \times 19$	4 pieces per axle
$\frac{3}{4}$ -ton int.	$22 \times 2 \times 18$	4 pieces per axle
1-ton ext.	$22 \times 2 \frac{1}{2} \times 21$	4 pieces per axle
1-ton int.	$22 \times 2 \frac{1}{2} \times 19 \frac{1}{2}$	4 pieces per axle
2-ton ext.	$26 \times 2 \frac{1}{2} \times 25 \frac{1}{2}$	4 pieces per axle
2-ton int.	$26 \times 2 \frac{1}{2} \times 24 \frac{1}{2}$	4 pieces per axle
$3 \frac{1}{2}$ -ton int. wheel	$31 \frac{1}{2} \times 3 \frac{1}{2} \times 55 \frac{1}{2}$	2 pieces per axle
$3 \frac{1}{2}$ -propeller	$26 \times 4 \frac{1}{2} \times 31$	1 piece per axle

Relining may be done in the usual manner, but the repairman must be care-

ful to maintain the band round or it will interfere seriously with subsequent adjustments when brakes are remounted.

Internal—Proceed as for external at rear. Lift cam faces over washer on camshaft and remove band complete.

If it is desired to remove camshafts,



Sectional view of the Torbensen rear axle showing its construction and location of adjustments

release clamp bolt on lever at inner end and tap it off lightly with hammer. Pull out camshaft.

### Removal of Differential

As on all orthodox types of axles it is impossible to remove the differential without first removing the shafts transmitting power to the wheels. To remove the differentials on Torbensen axles, proceed as follows:

- 1—Remove wheels as above.
- 2—Remove bolts which hold plate inside of jack shaft pinion. This also releases flange next to brake carrier on jackshaft tube.
- 3—Pull out jackshaft.
- 4—Unscrew packing gland in jackshaft tube outer flange and slide flange toward center of axle.
- 5—Unscrew packing gland in jack-

shaft tube inner flange and slide tube out from center until it clears differential carrier complete.

*Note:* Operations 4 and 5 are necessary only on 2-ton model after 1919 where the differential only is to be removed and not the housing. These may be identified by the slotted locking rings on the adjusters against the side of differential housing.

- 6—Remove stud nuts holding the rear half of differential housing in place.
- 7—Remove rear half of housing.
- 8—Remove differential with bearings.

To remove pinion and bearings proceed as follows:

- 9—Remove forward nut on pinion shaft.
- 10—Remove locking washer.
- 11—Remove adjusting nut in back of washer.

- 12—Pull pinion out from back of carrier.

- 13—Remove cap screw and lock for slotted flange on felt retainer at forward end of housing neck.

- 14—Unscrew felt retainer.

- 15—Remove cap screws and adjusting hold cover for pinion bearings.

- 16—Unscrew adjusting ring (between bearings) towards rear. This will remove rear bearing cup (R. H. threads).

- 17—Remove forward bearing cup with drift.

### To Remove Differential Housing

- 18—Proceed as in operations 1-2-3-4-5.
- 19—Remove stud nut on front side of I-beam holding differential housing in place.



20—Tap housing out with lead hammer.

*Note:*—On recent models set screws are provided for forcing carrier housings out of I-beam.

## Gear and Bearing Adjustments

Wheel bearings:—

1—After wheel is in place and outer cone is in position on spindle screw up inner lock nut tight against the outer bearing and revolve or oscillate wheel while so doing.

2—Back off nut enough to allow for a barely perceptible play in the bearings. Grip tire on front and rear and try to wobble wheel to detect any excessive looseness.

3—Replace locking washer.

4—Replace outer nut and screw up tight against the washer. Rotate wheel again to ascertain bearings have not been cramped in tightening. Outer nut wheel must turn freely.

5—Replace cotter pins.

**Pinion Bearings**—To take up endplay in pinion bearings back off forward nut on pinion shaft enough to permit taking up on adjusting nut in back of locking washer. Turn nut until there is a just perceptible endplay. Tighten up on forward nut and try again for endplay. If pinion shaft turns freely and there is still a barely noticeable play in bearings they are adjusted right. Bend over flaps on locking washer to securely hold nuts.

**Differential Bearings**—The following applies to right hand bearings only. Do not disturb left hand bearing. To take up play in differential bearings remove right hand bearings adjuster locking key and loosen stud nuts holding rear half of differential housing on right hand side only. Turn adjuster, (right hand threads) until all endplay is taken up. Tighten up on nuts and replace lock.

**Internal gear adjustment**—There is no adjustment provided for internal gear and pinion. Better results may be obtained for quietness by changing the wheels around if gears are noisy.

**Bevel Gear Adjustment**—Bevel or differential gears are carefully adjusted on all new axles and should not be disturbed as long as they run quietly. If it becomes necessary to adjust gears, the simplest method is to:

1—Remove cover on pinion bearing housing in front of I-beam and turn adjuster one notch at a time to the left. This moves pinion toward the gear. If noise develops reverse the direction.

2—If no results are obtained jack up axle and remove differential housing cover.

3—Clean grease off gear teeth and apply a thin coating of red lead or Prussian blue and note the impression from pinion teeth after turning gear a few times. The impressions should be distributed over the teeth uniformly from end to end.

4—If it is necessary for lack of tooth contact or on account of back lash to move gear, take up endplay in differential bearings as under heading "Differential Bearings." Move gear toward pinion by loosening the right hand bear-

ing a number of notches and taking up on the left hand the same number of notches. Reverse operation if gear is to be moved away from pinion in which case loosen left hand bearing first. Paint teeth again and turn gear until the impression shows a satisfactory tooth contact.

5—Move pinion in or out until the quietest running point is found. Bevel gears should have a back lash of approximately .005 in.

## Lubrication

Torbenzen axles have grease cups for jackshaft bearings and internal gears. Use a soft grease or non-fluid oil.

The internal gears should be given a coating of non-fluid oil before wheel is put onto axle. Then turn the grease cups for the internal gears one turn every 200 miles. Examine gears every 2000 miles. See how much grease is left and govern future use of lubricant accordingly.

Jackshaft bearings should be packed with a soft grease or non-fluid oil and give grease cup a full turn every 500 miles thereafter.

For the differential use a lubricant which will not lose its lubricating qualities or solidify at low temperatures, nor thin out at high temperatures.

To lubricate, remove filled plug in differential housing cover and fill until even with hole. Examine every 2000 miles and lubricate as necessary.

To lubricate wheel bearings use a soft grease or non-fluid oil. Fill hub and examine every 2000 miles, by removing hub cap. Fill as is necessary.

The brake shafts are equipped with self lubricating bushings and need no attention except for a few drops of thin oil occasionally between the brake levers and the brackets.

Brake anchor pins and toggle joints should receive a few drops of thin oil occasionally and the internal brake cam faces whenever wheel is removed.

# Your Waukesha Truck Engine

(Continued from page 177)

or a three-cornered file on which the teeth have been ground off, by simultaneously fitting and scraping the high spots.

## Endplay in Pump Shaft

Taking up endplay in the pump shaft is accomplished by removing the roller bearing housing in the gear cover directly back of the fan pulley by removing the wire lacing from the cap screws and then removing the cap screws. Now remove the housing from the shaft, using a slight pry if necessary; but be very careful and not damage the thin spacers placed between the bearing housing gear case cover for the purpose of making this adjustment. In the bearing housing you will find two dowel pins which align the bearing housing with the bearing in the crankcase. Remove enough spacers to take up the endplay in the pump shaft, and replace the housing and remaining spacers in the gear cover. In replacing the bearing housing be sure and replace the dowel pins which hold the housing in place and lace the three cap screws, which fasten the bearing housing to the gear case cover, with strong wire.

## Push Rods and Guides

In order to remove the push rods and guides on Waukesha engines it is not necessary to remove the valve and valve springs. All that will be necessary is:

1—Release the lock nut on adjusting screw.

2—Turn adjusting screw down as far as it will go.

3—Remove crab or crowfoot that holds push rods in place.

4—Place medium size screw driver under valve stem and place small block of wood (proper height) under screw driver for leverage and then raise valve as high as it will go.

5—Lift out push rod and push rod

guide. The push rod cannot be removed as described above without removing guide also, as a small lug on the push rod roller pin fits into a slot in the lower end of the guide.

The method of adjusting the governor described herewith is for use when it has been necessary to disconnect some of the governor mechanism for repairs or inspection.

## Governor Adjustment

The operation of the governor is as follows: Two weights in the gear chamber behind gear A, in Fig. 1, are held by and swivel about the two pins marked B. These weights fly out when the engine speeds up, moving governor shifter S outward. This action presses the ball bearing thrust contained in retainer D outward, moving lever E.

This lever E swivels on pin F, which is held in the gear cover. The movement of E causes a movement of rod G in the direction indicated by arrow. The movement of rod G closes valve H which is of the butterfly type and swivels on shaft J.

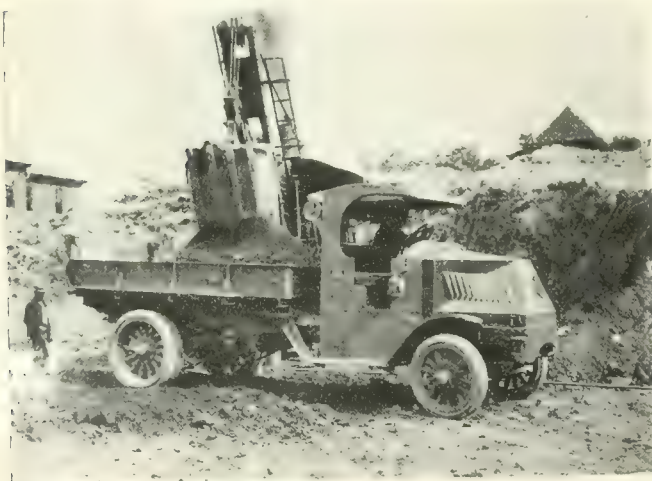
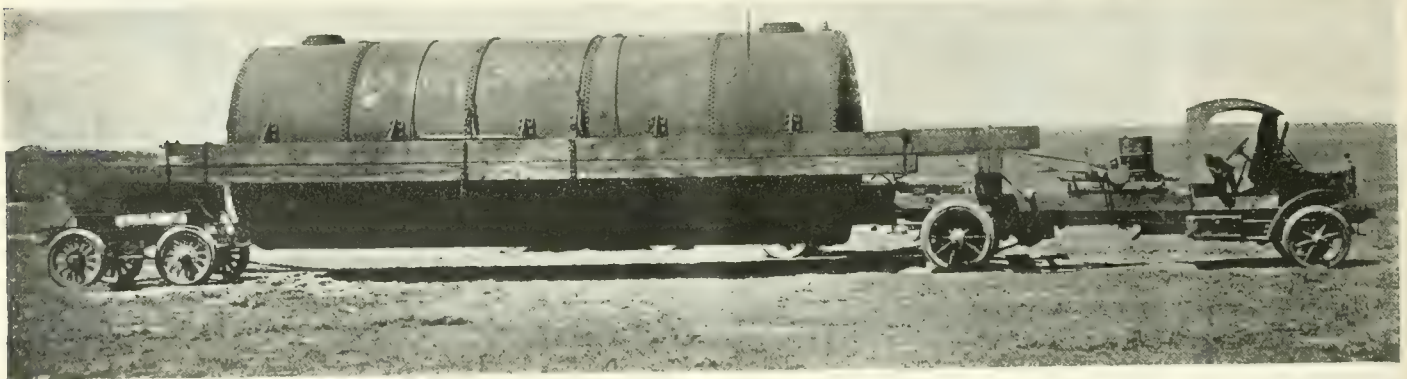
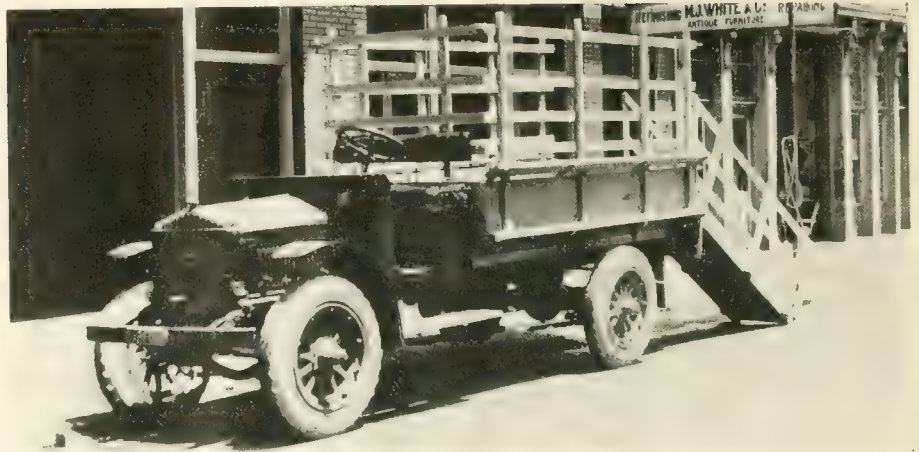
The valve H is slightly longer on one end than the other, and the edges are beveled to fit the walls of the manifold. In replacing this valve be sure that the short end of the valve is toward the carbureter. Keeping the short end of the valve toward the carbureter it is still possible to assemble the valve in two positions, only one of which is correct, for it will close properly when assembled so that movement of governor rod closes it entirely without friction or binding.

The adjustment for speed is made by turning screw K. Turning K to the right causes the engine to speed up, while turning K in opposite direction causes engine to slow down. The governor is locked by locking nut L, and sealed by passing a sealing wire through the hole in the spring housing, and through a hole in the nut L.



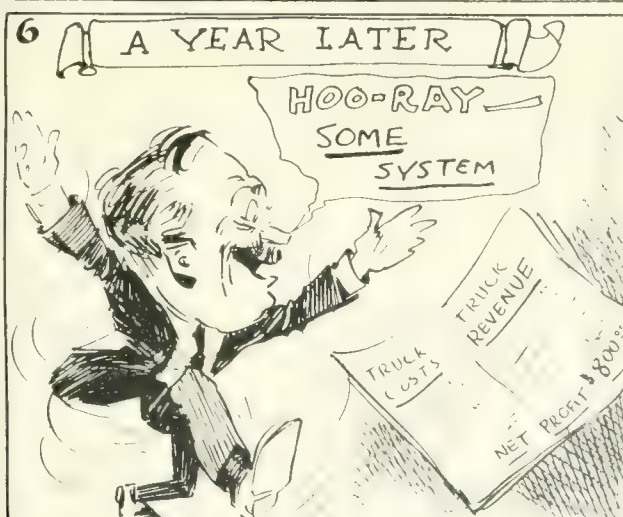
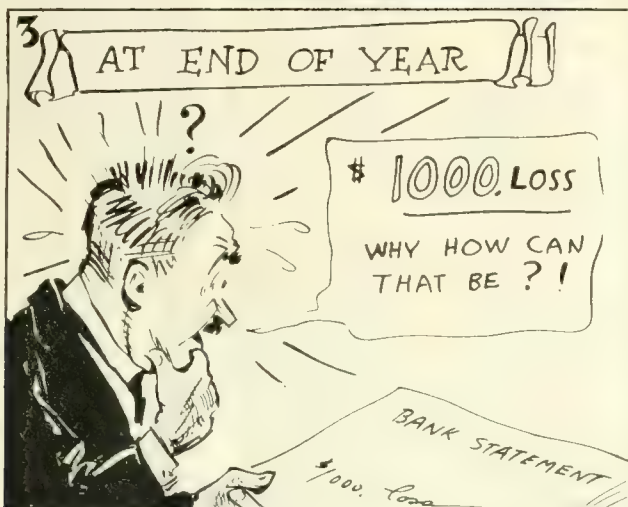
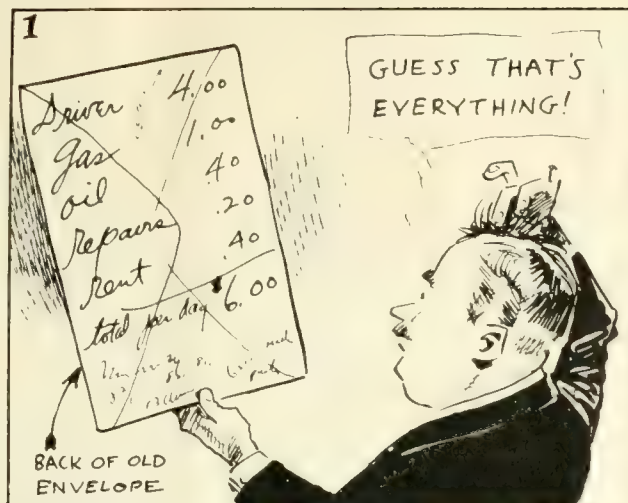
# What Trucks Are Doing!

1—Garford 1½-ton truck delivering livestock. The runway is 9 ft. long and 3 ft. wide. 2—Side and rear view of an ideal salesman's truck, built for speed. 3—"You can't haul that 15-ton tank with a truck!"—But they did. 4—No shovellers here! Loading with a steam shovel and unloading with a power hoist and dump body





# Is This Your Method?



Read the Story on  
the Next Two Pages





## ① The Commercial Vehicle—Truck Cost System

Month ending Dec 31 1920Make of truck WhiteGasoline  
Electric

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243 249 WEST 30TH ST. NEW YORK

## Operating Charges

Gasoline	274 gals.	@ .28	\$ 76.72
Current	kw-hr.	@	
Oil	85 qts.	@ .115	9.78
Grease	10 lbs.	@ .10	1.00
Kerosene	gals.	@	
Waste	lbs.	@	
Dye Water	gals.	@	
Driver	26 days	@ \$5.25	136.50
Helper	days	@	
Mechanic	50 hrs.	@ .75	37.50
<b>A-Total Operating Charges</b>			<b>261.50</b>

## Maintenance Charges

*Tires	904 miles	@ .05	\$ 45.20
Repairs			10.45
Overhauling, painting, etc.			
Spare vehicle rental			
Garage rental (pro rata)			8.50

B-Total maintenance charges

64.15

## Fixed Charges

Insurance, fire	\$10.00	per year	\$ 7.50
Liability	\$	per year	27.50
Collision	\$	per year	
Interest	6	(On Item 1—12)	27.50
Depreciation on chassis		%	
Depreciation on body		%	
Depreciation on equipment	20	%	91.67
*Depreciation on tires		%	
Total taxes and licenses			12.47

C-Total fixed charges

139.16  
464.81

\*Note: Omit one of these.

## ② The Commercial Vehicle—Truck Cost System

Number of Truck 23Capacity in lbs. 10,000Chassis No. 41303

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243 249 WEST 30TH ST. NEW YORK

## Investment

Cost of chassis, less tires	
Cost of body	
Cost of equipment	
Cost of tires	
<b>1-Total cost, complete</b>	<b>\$ 5500.00</b>

## Performance Record

2-Days operated	26
3-Days idle	5
4-Days maintained (Item 2—Item 3)	31
5-Total hours operated	234
6-Total miles covered	904
7-Total trips made	301
8-Total tons on package or stop	1505

## Performance Averages

9-Average miles per day maintained (Item 6—Item 4)	29
10-Average miles per day operated (Item 6—Item 2)	34
11-Average miles per trip (Item 6—Item 7)	3
12-Average tons, package or stop per trip (Item 8—Item 7)	5
13-Average commercial ton miles, package miles or stop miles per trip (Item 11 x Item 12)	15

## Recapitulation

14-Total expenses for month (Sum of Items A, B and C)	\$ 464.81
15-Cost per day operated (Item 14—Item 2)	17.87
16-Cost per day maintained (Item 14—Item 4)	14.96
17-Cost per mile operated (Item 14—Item 6)	.5103
18-Total commercial ton-miles, package miles or stop miles (Item 7 x Item 13)	451.5
19-Cost per commercial ton-mile, package mile or stop-mile (Item 14—Item 18)	1.029

## ③ The Commercial Vehicle—Truck Cost System

Month ending Dec 31 1920Make of truck WhiteGasoline  
Electric

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243 249 WEST 30TH ST. NEW YORK

## Operating Charges

Gasoline	274 gals.	@ .28	\$ 76.72
Current	kw-hr.	@	
Oil	85 qts.	@ .115	9.78
Grease	10 lbs.	@ .10	1.00
Kerosene	gals.	@	
Waste	lbs.	@	
Dye Water	gals.	@	
Driver	26 days	@ \$5.25	136.50
Helper	days	@	
Mechanic	50 hrs.	@ .75	37.50
<b>A-Total Operating Charges</b>			<b>261.50</b>

## Maintenance Charges

*Tires	904 miles	@ .05	\$ 45.20
Repairs	904 miles @ .025		22.60
Overhauling, painting, etc.	(Included in repairs)		
Spare vehicle rental			
Garage rental (pro rata)			8.50

B-Total maintenance charges

76.30

## Fixed Charges

Insurance, fire	\$192.50	per year	\$ 16.04
Liability	\$50	per year	4.17
Collision	\$50	per year	27.50
Interest	6	(On Item 1—12)	27.50
Depreciation on chassis		%	
Depreciation on body	20	%	83.33
Depreciation on equipment		%	
*Depreciation on tires		%	
Total taxes and licenses			12.47

C-Total fixed charges

143.53  
481.33

\*Note: Omit one of these.

## ④ The Commercial Vehicle—Truck Cost System

Number of Truck 23Capacity in lbs. 10,000Chassis No. 41303

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243 249 WEST 30TH ST. NEW YORK

## Investment

Cost of chassis, less tires	\$ 4063.00
Cost of body	
Cost of equipment	937.00
Cost of tires	500.00
<b>1-Total cost, complete</b>	<b>\$ 5500.00</b>

## Performance Record

2-Days operated	26
3-Days idle	5
4-Days maintained (Item 2—Item 3)	31
5-Total hours operated	234
6-Total miles covered	904
7-Total trips made	301
8-Total tons on package or stop	1505

## Performance Averages

9-Average miles per day maintained (Item 6—Item 4)	29.16
10-Average miles per day operated (Item 6—Item 2)	34.77
11-Average miles per trip (Item 6—Item 7)	3
12-Average tons, package or stop per trip (Item 8—Item 7)	5
13-Average commercial ton miles, package miles or stop miles per trip (Item 11 x Item 12)	7.5

## Recapitulation

14-Total expenses for month (Sum of Items A, B and C)	\$ 481.33
15-Cost per day operated (Item 14—Item 2)	18.51
16-Cost per day maintained (Item 14—Item 4)	15.53
17-Cost per mile operated (Item 14—Item 6)	.53
18-Total commercial ton-miles, package miles or stop miles (Item 7 x Item 13)	2257.5
19-Cost per commercial ton-mile, package mile or stop-mile (Item 14—Item 18)	2.132

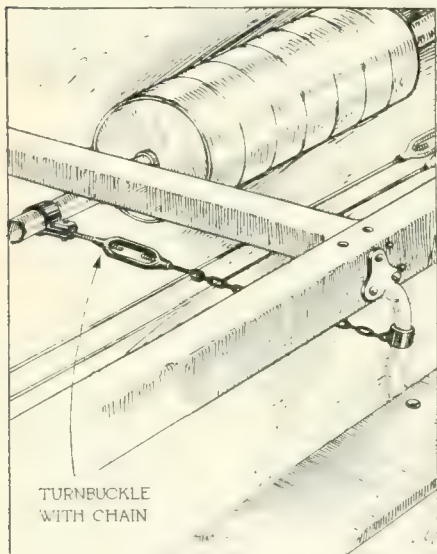
On these four sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks are laid out, first, costs on a 5-ton White truck, as estimated by the operators of the truck and, second, the costs on the same truck re-estimated with corrections. 1—Operating, Maintenance and Fixed Charges as estimated by the operator. 2—Performance Record, Averages and Recapitulation by the operator. 3 and 4—The costs on the same truck corrected. Note that the Total Charges on Sheet 3, as corrected are a little higher than on Sheet 1. But the final Cost per Ton-Mile on Sheet 4 is over twice as large as the same item on Sheet 2

# The Better Way

## To Save Time in Truck Repair and Maintenance

### No. 426—To Prevent Exhaust Pipe Silencer Rattles

**A**LTHOUGH the exhaust pipe and silencer are part of the sprung weight of the truck, the constant jolting and jarring over rough roads and car tracks will often loosen the exhaust pipe or the silencer fastenings to some extent, with the result that there will be a continuous rattling from these parts when the truck is running. The loosening may not be sufficient to be serious and to require tightening the various parts, but it will



No. 426—Stops Rattling

**T**O help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

detract from the smooth running impression made by the truck. In this case the rattles may be easily prevented by the device shown in the accompanying illustration. An ordinary hose clamp is placed around the exhaust pipe and connected to a turnbuckle. This in turn is

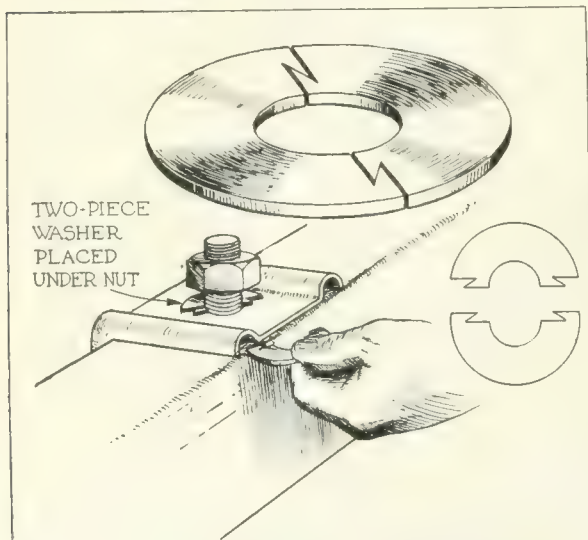
attached to the running board bracket as shown. Tightening up the turnbuckle from time to time will eliminate the rattle, so that the truck will make a smarter impression on the road.—DEWITT F. RAHM, Little Falls, N. Y.

### No. 427—Two-Piece Washer Prevents Removing Nut

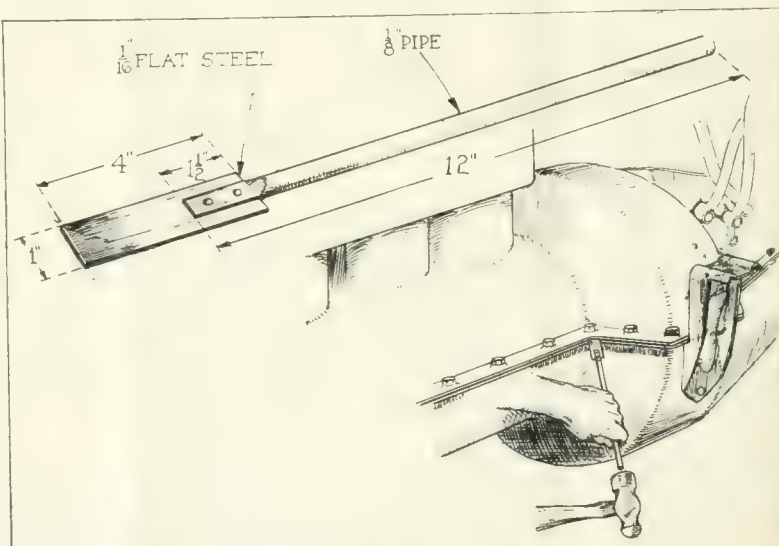
**E**FFICIENCY in repair work is one of the two prime necessities in the modern repair shop. But the other necessity, saving time, is almost if not equally as important, and any method in repairs or new device which figures in repairs and which will serve to save time in these operations is important and valuable, no matter how slight the time saved may be, each time it is used. Such a device is shown in the accompanying illustration. It is a metal washer, made in two parts, the two halves being cut in such a way that they will clamp together. To apply the washer, it is only necessary to loosen the bolt a distance a little over twice the thickness of the washer. The latter can then be slipped into place so that the two halves are fitted together, without removing the bolt altogether. When the nut is screwed tight again the washer cannot come off.—R. G. DASSE, Burlington, Vt.

### No. 428—Home-Made Tool for Packing Joints

**T**HIS tool will be found convenient in reassembling Ford powerplants after overhaul and it can be readily and



No. 427—Saves Removing Nut



No. 428—For Packing Joints



cheaply constructed in the truck repair shop. The tool is used in packing the joints between the Ford transmission cover and the cylinder block. It is shaped something like a straight spade on a small scale and can be constructed of 1/2 in. pipe for the handle, riveted to a small sheet of 1/16 in. steel 4 in. long by 1 in. wide. A convenient length for the handle, including the riveted portion, is 12 in. The accompanying illustration indicates the method of construction, the dimensions and the method of application.—EDWARD RUESCH, Buffalo, N. Y.

**No. 429—Old Ford Wrench to Remove Drain Plugs**

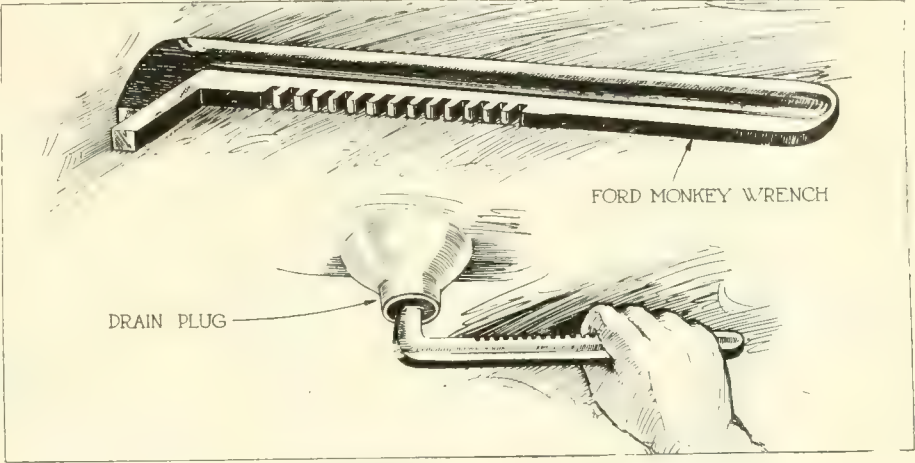
A WORN-OUT Ford monkey wrench will be found a convenient tool when it is necessary to drain the radiator or other parts of a truck. The lower jaw of the wrench is removed altogether and the upper jaw squared on the end in the manner shown in the accompanying illustration. Although the wrench would otherwise be thrown away, when treated in this way it will make a convenient tool for removing the drain plug from the radiator, the crankcase or the differential of a truck. The method of application is indicated in the illustration.—I. M. SIMPSON, Pryor-Simpson Motor Co., Stevenson, Ala.

**No. 430—Repairing Loose Ford Radius Rods**

THIS is a method for repairing radius rods which have worked loose in the spring perches on a Ford truck. A split and tapered bushing is used, split far enough so that it will close on the front radius rod. A tapered hole is reamed with a tapered reamer in the spring perch. The reaming is done from the front. To eliminate too large or too small a reaming a stop is put on the

reamer. Here is the method to be employed. Replace the radius rod, drive the tapered bushing into place, screw the nut tight against the bushing and replace the cotter pin. The hole in the spring perch should be reamed small enough so that the bushing will protrude slightly from the perch and so that the nut will be tight against the bushing instead of against the perch. If

possibly get lost when the truck strikes a bump or a depression in the road, as they are sometimes lost in this way. At the same time, the fasteners permit the driver or his assistant to remove these side boards without loss of time, when necessary for loading or unloading. The two different types of fasteners are clearly shown in the illustration. The upper hook may be held in its socket by



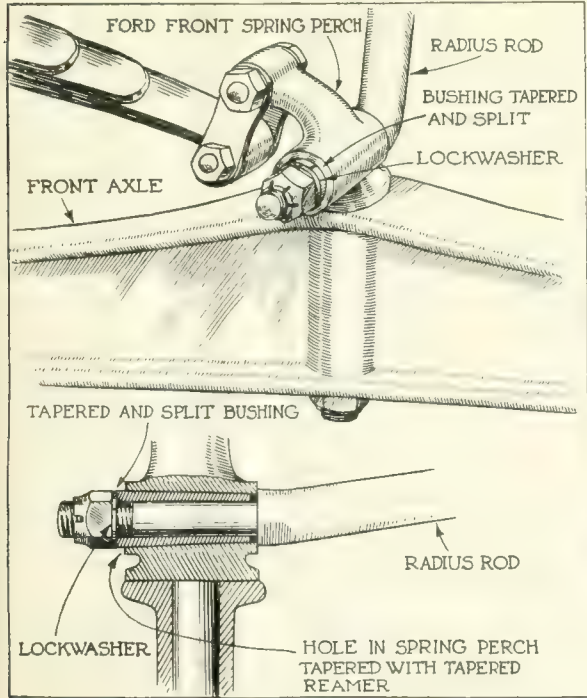
No. 429—To Remove Drain Plugs

the bushing should protrude, so that the nut cannot be cottered, a lock washer can be used instead of the cotter pin. The accompanying illustration indicates the application and the method of operation of this device.—WM. H. ROEHRIG, Utica, N. Y.

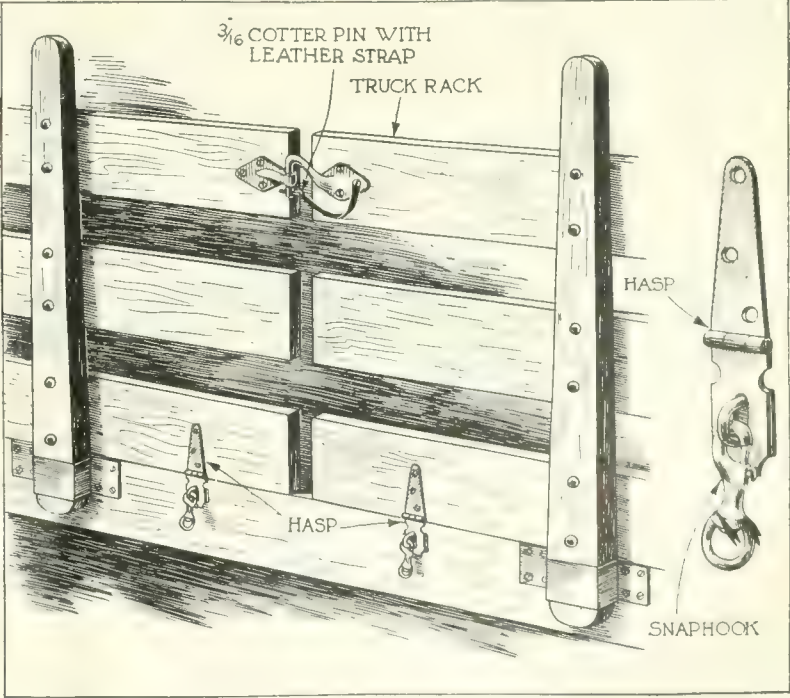
**No. 431—Fasteners for Truck Side Boards**

THIS device consists of two different methods of attaching the truck stakes and side boards to each other and to the body, so that they cannot fall off and

drilling a small hole through the end of it and, when the hook is in its socket, passing a cotter pin on a leather strap through this hole. It will not be necessary to spread the cotter pin as it will stay in place without, but then a sharp pull on the strap, the other end of which is fastened, will pull out the cotter pin so that the hook may be lifted out of its socket. The lower fastenings are simply barn door hasps and harness snaphooks and are used instead of padlocks to save time.—H. E. MARSDEN, Standard Cartage Co., Detroit.

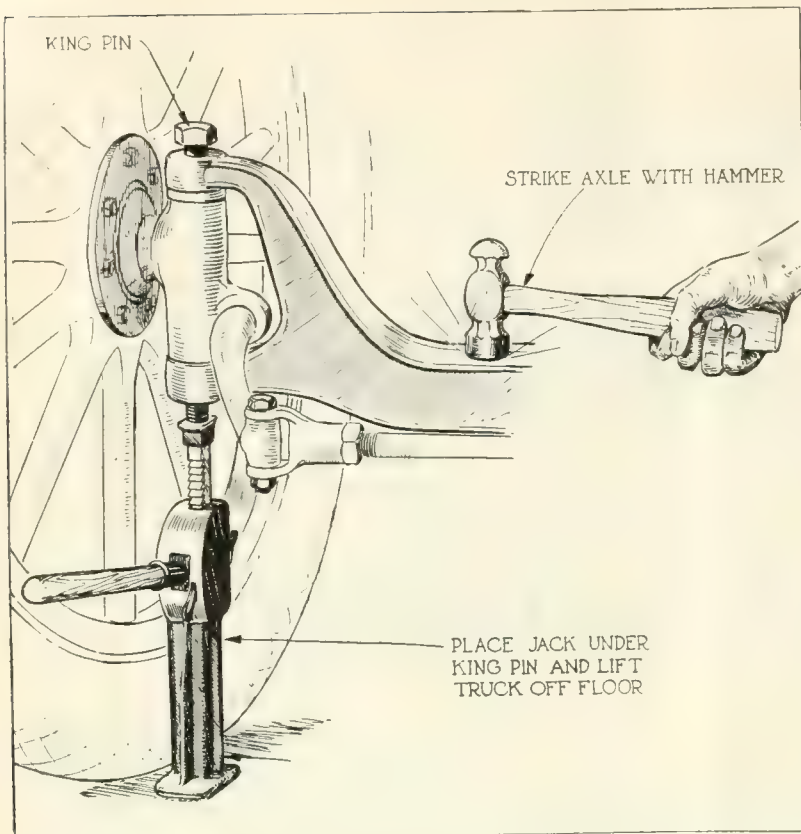


No. 430—Radius Rod Tool



No. 431—Side Board Fasteners





No. 432—To Remove King Pin

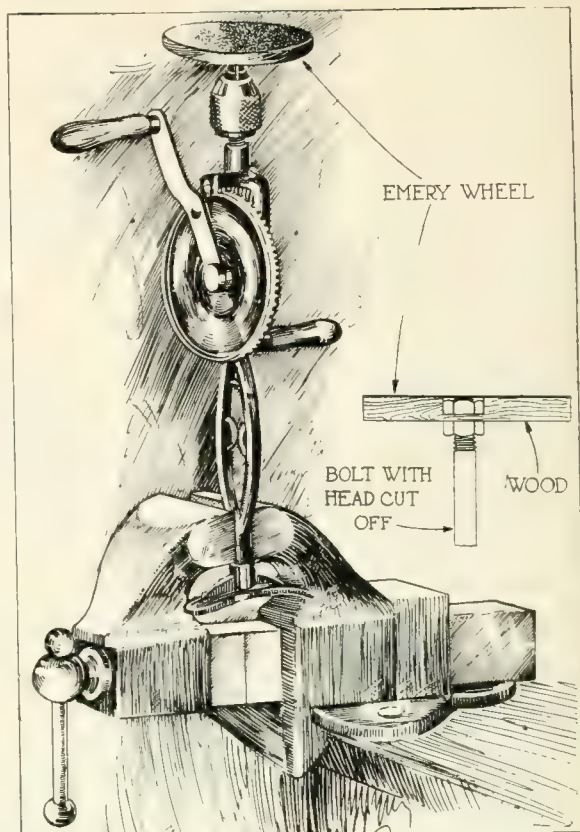
### No. 432—Jack and Hammer to Remove King Pin

HERE is a convenient method by which the weight of the truck can be employed to help remove the king pin in the front axle. When the front axle of a truck requires straightening or has to be disassembled for any other reason, the king pin may be removed in the manner shown in the accompanying illustration. A jack is placed under the king pin and raised until the wheel of the truck is clear of the floor. The axle is then

flush with the bottom of the axle, another pin can be used to drive it out the remainder of the way.—GEORGE F. BUSCH, Buffalo, N. Y.

### No. 433—Handy Repairshop Surface Grinding Tool

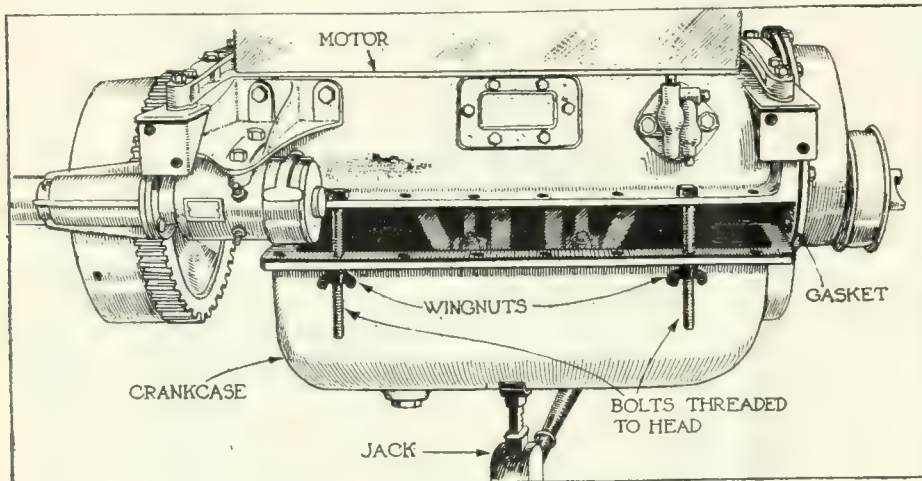
HERE is a method for constructing a surface grinder to be used with a breast drill. A circular section is cut out of a piece of flat wood and the section is counterbored for the head of a carriage bolt and bored through for the



No. 433—Grinding Tool

hold the bolt firm in the wood, as the smaller illustration shows. A circular piece of emery cloth is then glued down to the flat surface of the wood and the projecting stem of the bolt inserted in the chuck of the breast drill. If the breast drill is then fastened in the vise, in the manner shown in the larger illustration, the device can be used for grinding shims, piston rings, etc.—DEWITT F. RAHM, Little Falls, N. Y.

### No. 434—Easy Method of Replacing Crankcase



No. 434—When Crankcase Is Replaced

struck with a hammer as shown so that the weight of the truck and the jar of the blow loosen and start the king pin. If the pin cannot be removed when it is

stem of the bolt. The carriage bolt is inserted in the wood so that the head is flush with the surface of the wood and a nut is screwed on the stem and used to

AFTER the engine has been disassembled and overhauled, especially when a new gasket has been installed, it is sometimes a very difficult matter to replace a heavy crankcase without damaging or destroying the new gasket between the engine itself and the crankcase. This difficulty can be overcome and the crankcase replaced without damage to the gasket, by the method indicated in the accompanying illustration. Select four long bolts, threaded to the end and small enough to pass through the bolt holes on the engine and crankcase. Install two of these bolts on either side of the engine and apply the crankcase, allowing the bolts to pass through two of the bolt holes on it. The crankcase can then be drawn straight and truly into place without damage to the gasket by drawing up on wing nuts which should be run onto the four bolts. If the crankcase is very heavy, a jack placed beneath it will assist in the operation.—W. A. KRAUS, Economy Grocery Co., Waterbury, Conn.

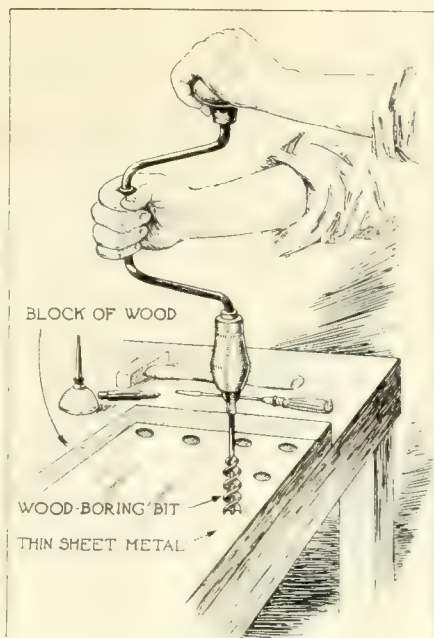


## No. 435—Small Lever to Test Oil Level

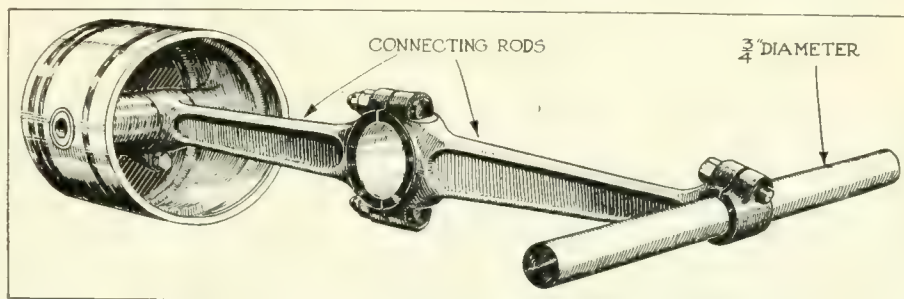
EVERY driver of a Ford truck knows that it is necessary to test the level of the oil in the flywheel case frequently, so as to be sure that the engine is receiving plenty of lubrication. There are two small cocks on the lower part of the flywheel case, the lower of which can be used to drain off some of the oil, when new oil is put in. The upper is used to test the oil level, the level being correct when oil will drip slowly from this upper cock. However, to test the level in this way it is usually necessary to lie down on the ground and reach in under the truck, an inconvenient and often dirty job, especially if the truck is out on a long run. This inconvenience may be avoided by the following method: Drill a small hole in the lever of the upper cock with a No. 30 or 31 drill. A hole is then drilled in the splash pan to line up with this cock and an old Ford carburetor pull rod passed through this hole. The pull rod is then passed through the hole in the lever and fastened as shown in the illustration. By this means the oil level may be tested at any time, without getting down under the truck.—WM. H. ROEHRIG, Utica, N. Y.

## No. 436—To Cut Holes in Sheet Metal

THE accompanying sketch indicates a simple and practical method of cutting bolt holes or rivet holes in sheet metal. Cutting holes in the metal may be easily accomplished by laying the latter on a flat piece of wood and then selecting a wood boring bit of the size for the hole required. Make a center punch hole in the sheet metal for the center of the hole to be bored and start the point of the bit through the center punch hole. When the point of the bit has pierced the metal sufficiently, the lips of the bit will then cut out the hole the size required. If the sheet metal shows a tendency to twist around on the block of wood with the action of the bit, it can easily be held firm to the block by means of one or two C clamps passed



No. 436—Sheet Metal



No. 437—To Lap Piston

beneath the edge of the workbench.—M. S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

## No. 437—Two Connecting Rods to Lap Piston

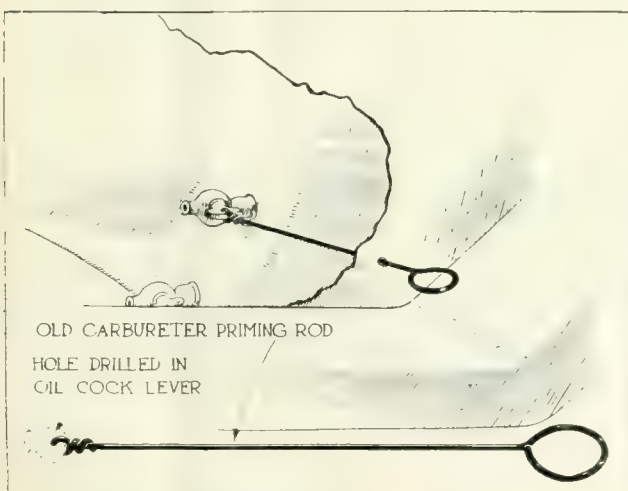
THERE are many better way devices which involve the construction of handy tools or a new application of an old tool, but mechanical ingenuity seldom succeeds in adapting parts of the engine

itself as tools with which to work on other parts, as has been done in this case. The operator wished to install a new piston in a Ford truck. He bought his piston and piston rings and then discovered that he had no tool suitable for lapping in his new piston. He had about determined to have this done at a service station when it occurred to him to use two of the connecting rods in the manner shown in the accompanying illustration. The caps of the rods are removed, the big ends joined together and a handle of  $\frac{3}{4}$  in. wood or pipe or rod passed through one piston pin bearing. The other piston rod is assembled with the new piston in the ordinary way and the piston is ready to be lapped in with this handy tool.—C. STAYMAN, Akron, O.

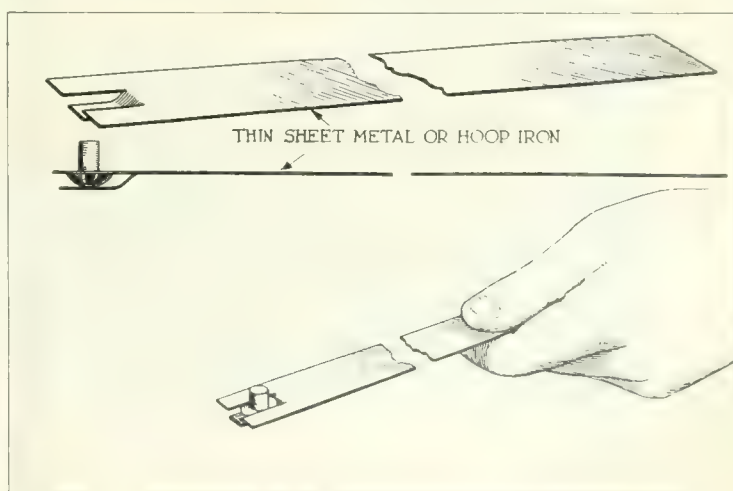
## No. 438—To Place Rivets in Awkward Places

HERE is a handy little tool which will cost no money and very little time to construct, but which has proved a great convenience in repair work. Take

a narrow section of thin sheet metal and at one end cut two slits in it for a short distance. The small section thus left in the middle is bent twice in the manner shown in the accompanying illustration, so as to take a rivet, but the space left should be small enough so that the spring of the metal will hold the rivet firmly in place. The device is for use when it is necessary to install rivets in places not easily accessible.—CLAUDE HODDLEY, 15807 Log Cabin Ave., Detroit.



No. 435—To Test Oil Level



No. 438—For Awkward Places



# An Electric Truck That Speeds Up Terminal Work

*Loads Handled Direct from Railroad Platform to Warehouse or Factory—May Be Run at Considerable Speed Over Ordinary Paved Streets*

A CROSS between the regular industrial truck designed for use only on railroad platforms, steamship piers and factory floors, and the commercial truck for road service has been developed by the Terminal Engineering Co., Inc. It is based on the idea that there is a great deal of transportation between freight terminals and warehouses, for instance, which are only a short distance apart, say not more than a mile, and are connected by paved streets. If the freight is first handled at the dock or freight station on an industrial truck, then transferred to a commercial vehicle to be hauled to the warehouse and there again handled indoors on an industrial truck, a great deal of effort is wasted in loading and unloading. The Tec truck is designed to take the freight as it is unloaded from the steamer or freight car and carry it directly to its ultimate destination, even if this be on the top floor of a warehouse, provided the distance is not too great and the route is over hard surfaced roads.

In the design of this truck two points in particular were aimed at, namely, to secure unusual maneuverability, so as to be able to make short turns in factory and warehouse aisles; and to select such wheel and tire equipment as to make it possible to run at considerable speed over ordinary paved streets rather than over floors only. The truck, moreover, is of the lifting type and is used in connection with a set of loading platforms on which the load is piled and from which it is removed while the truck is engaged elsewhere.

In order to secure maximum maneuverability the truck was made of the four-wheel drive, four wheel steer type. In this way the turning radius is reduced to one-half what it would be with two wheel steer and the same wheel base and maximum steering wheel deflection. There is an electric motor on each wheel, so that the usual difficulties of transmitting power to a swiveled drive wheel are here eliminated, the motor turning with the knuckle in steering. The truck

has a capacity of 5,000 lbs. and weighs complete 4,700 to 4,900 lbs. There are five motors in all on each truck, four for the drive and the fifth, which is of the same size as the others, for operating the lifting jacks. All are G. E. motors, with the rating of 17 amperes at 60 volts. The Terminal Engineering Co., Inc., makes its own controllers which give three forward and three reverse speeds and also permit of the use of the motors for braking purposes. The wheel drive gearing is built under the patents of the Commercial Truck Co. of Philadelphia. The reduction from the armature shaft to the road wheel is in two stages, the first reduction being by a pair of spur gears and the second through a spur pinion and internal gear. The reduction mechanism is completely enclosed and operates therefore under the most favorable circumstances. There is an expanding brake on the intermediate shaft of the drive to each wheel, and braking effort can therefore be exerted on all four wheels.



1—Tec truck moving canned goods. 2—Heavy sacks from the bulkhead to warehouse. 3—Carrying flour on crowded piers where ordinary trucks cannot penetrate. 4—Weather protection for operator and load. Canopy top for driver and tarpaulin for the load



The wheels are 20 in. in diameter and are fitted with 5-in. solid rubber tires. These tires are 3-in. deep, thus providing the same depth of rubber cushion as the solid tires on large-wheel street trucks, rather than the lesser cushion which is standard for indoor floor purposes.

The frame is built up of 4-in. channel steel, hot riveted. It is supported on the axle by four half elliptic springs 26 in. long by 2 in. wide. The wheel units and jack units are packed with grease, so that the lubrication of the transmission gearing is effected automatically. Other bearing points are lubricated from oil reservoirs.

The elevating mechanism consists of four steel screw jacks driven by a roller chain direct from an electric motor. One of the reasons for using the chain drive is that weaving of the truck frame does not cause binding in the drive. The travel of the jacks is controlled from the dash. The maximum travel is 9½-in. and the limit of the stroke is controlled by a mechanical friction slip on the drive.

Either an Exide or an Edison battery can be used on the truck, the Exide being either the 34 cell M. V. 9 or the 35 cell M. V. 11 type and the Edison the 59 cell A-4 or G-6. There is a hinged cover in the truck deck, which permits of quickly changing the battery if it is desired to use the truck continuously. Another advantage of the hinged cover is that it permits of easy inspection of the battery. A charging receptacle of the Anderson type is provided, and there is an extra charging receptacle underneath the driver's platform for convenient use when charging the battery on the truck.

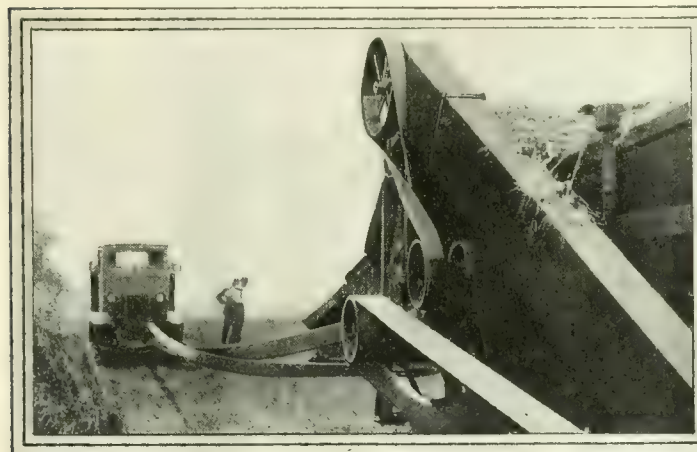
The controller is of the drum type and is mounted on the dash. Owing to the fact that a higher voltage is used than the conventional industrial truck voltage, the operating current is comparatively low, and this, together with wide controller fingers, reduces the wear of these fingers. The speed range, light, is ½ to 10 m.p.h. and with full load, ½ to 7 m.p.h. Resistance is used in the main circuit only on the low speed, and on the high and intermediate

speeds there is therefore no loss in outside resistance.

The frame is provided with stake pockets which are of steel, hot riveted to the inside of the frame, giving flush frame sides. Stakes can be conveniently carried in the rear of the dash when not in use. An automatic coupler is furnished with the truck, with 2 x 8-in. double acting helical springs to prevent shocks when towing trailers, shifting loaded freight cars and other heavy work. Trailers are uncoupled from the dash. The equipment furnished with the truck includes red and white running lights with Conophor lens both front and rear. These lights are set in the frame so they are protected against injury. Other items of equipment include an electric horn, license plate brackets, Sangamo ampere-hour meter and Veeder odometer.

It is noteworthy that anti-friction bearings are used throughout the truck, the armature shaft bearings being of the ball type and the bearings on the intermediate shaft and the axles, roller bearings.

## New 2-Ton Case Truck for Farm Haulage



Two-ton Case truck with its belt pulley in operation on a farm



Side view of new 2-ton Case truck showing cab and other standard equipment

AFTER a number of years' study of the farmer's transportation requirements, the J. I. Case Plow Works Co., Racine, Wis., has placed on the market a 2-ton internal gear-driven truck especially designed to meet the requirements of farm haulage. Every precaution has been taken to protect against dirt and grit. The truck is designed around the powerplant and patented U-shaped, one-piece frame of the Wallis tractor.

The main frame is made of 6-in. 8-lb. channel iron. There are five cross beams, heavily riveted to the side members and reinforced at the corners by heavy gusset plates. Two hooks are provided at both the front and the rear, and a bumper is also provided. The latter is pivoted at the ends and is easily swung up out of the way either to crank the engine or when the belt pulley is in use, as shown in the illustration.

The U-frame supports the engine, ra-

CASE SPECIFICATIONS	
Capacity, tons	2
Price	\$3,000
Wheelbase, in.	144
Tires, front, solid	36 x 6
Tires, rear, dual, solid	38 x 7
Bore, in.	4¼
Stroke, in.	5¾
N.A.A.C.C. hp.	29.0
Speed, r.p.m.	1400
Speed, m.p.h.	20
Gear ratio in high gear	8 to 1
Final drive	Int. Gear

diator, front power take-off, gearset with hand and foot controls and the tire pump as an assembly and acts as a dust-proof under-housing as well as an oil reservoir for all these parts. Hand holes in the U-frame afford ready access to the interior working parts.

Both front and rear axles are of Torbensen make. Other units include Harvey semi-elliptic springs, Ross steering gear, and Spicer universal joints. Standard equipment includes a cab and body complete, seat cushions and upholstered back;

front fenders and running board; tool compartment with complete tool kit and jack; tire pump; bumper; Veeder hub odometer; horn; two headlights; taillight and spot light. The body is of stake design with a loading space of 66 by 120 in. The cab is of all-weather design, a self-contained unit, easily removable.

The four-cylinder engine is of the valve-in-head type with a removable cylinder head. A feature is the removable cylinder sleeves. Should a cylinder become worn or damaged, a new one can be quickly installed, without replacing a complete new cylinder block, thus saving time and money to the owner. The engine speed is under control of a hydraulic governor with an independent control for use when the belt pulley is in operation.

Ignition and lighting are by an Eisenmann magneto-generator and a Willard battery. Water circulation is taken care of by a centrifugal pump.



# Shop Equipment

*Time and Money Saved  
in Truck Repairs*

## Combination Grinder and Buffer

A COMBINATION floor grinder and buffer, which permits interchangeable buffing and grinding without the common delay of changing wheel, is the latest product of the Cincinnati Electrical Tool Co., Cincinnati, Ohio. This company manufactures a complete line of portable electrical drills and grinders.

The new machine is arranged with both grinding and buffing wheels. The grinding wheel is adapted to both tool grinding and general grinding of all kinds.

The motor winding is fully enclosed and protected, and the spindles are ground. Annular ball bearings are fitted on both ends of the armature spindle, as well as the end of the extension spindle. Dust caps, fitted to the spindle, protect bearings and windings from emery dust and dirt.

The grinders are fully equipped, including the tool board and water pot, and can be furnished without the floor pedestal if desired. The motors are made for direct or alternating current in  $\frac{1}{2}$ , 1, 2, and 3 hp. capacity to carry wheels from 8 to 14 in. in diameter.

The prices range from \$138 to \$336, according to size, on the direct current types, and from \$150 to \$348 on the alternating current types. These prices include the grinding wheel but no buffing wheel. The 3 hp. machine prices do not include the grinding wheel.

## Combination Grease and Oil Gun

A COMBINATION grease and oil gun has been placed on the market. This gun is made of brass and its exterior is highly polished. The plunger is of the double leather type with the leathers reinforced by two steel washers. The plunger locking thumb nut gives two actions, that of the screw-down type gun for greases, and that of the push-and-pull type for oils. The spout is pro-

### Combination Grinder and Buffer

*Grease and Oil Gun*

*C-O Engine Stand*

*Rustsolvo*

*Hopewell Thickness Gage*

*Clover Cylinder Lapping Tool*

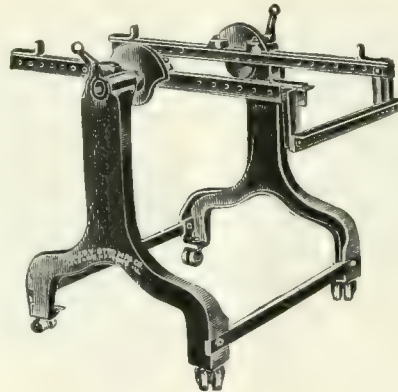
*New York Coil Tester*

*Spring Thread Tool*

*Durkee Eye Magnet*

*Adjustable Piston Vise*

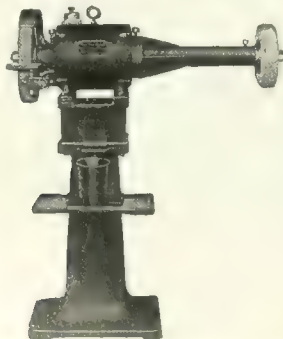
vided with an oil nipple which may be removed when the gun is used for grease. The price of the small size is \$2; the large size costs \$2.50. The maker is the World Metal Products Corp., Richmond Hill, N. Y.



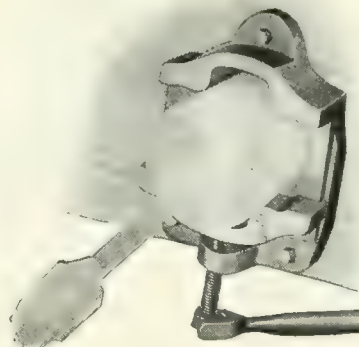
*C-O engine stand*



*Grease and oil gun*



*Combination grinder and buffer*



*Adjustable piston vise*

## C-O Universal Engine Stand

THE C-O universal engine stand is designed to meet all conditions. The engine can be turned in any position in a circle, instantly adjusted and locked by a slight turn of a friction clamp, no pin holes to line up or adjustments to make, thus making both ends of the engine, as well as the crankcase, accessible. A mechanic can readily remove the lower crankcase and bearings may be scraped in, and rods lined up with ease, in such a position as to be very easy to get at.

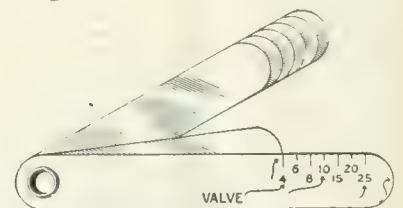
The stand is doubly braced and supported and it is portable, being equipped with specially designed double wheel casters, so that they can be easily taken to any part of the garage with the engine in the stand. The casters may be removed if the mechanic desires a stationary stand, or wishes to bolt the stand to the floor.

This stand is adjustable to 36 in. in width. The cross bars do not have to be removed while lifting or placing the engine on the stand with a floor crane. There are no bolts to enter any parts of the cylinder block. The block can be turned in either a vertical or horizontal position or any desired angle required, and locked.

The manufacturer is the Canedy-Otto Mfg. Co., Chicago Heights, Ill.

## Rustsolvo

RUSTSOLVO is a free flowing fluid and non-inflammable. It is claimed to dissolve rust, lead, paint, tar, grease or fat, and to cut carbon deposit, etc. When tearing down or taking apart a truck the application of Rustsolvo will make the task much easier, as it will quickly loosen up parts and connections which are stuck from rust or carbon. It can also be used to good advantage on the rear axle springs to preserve their resiliency. The maker is the Rust Products Co., 1026 Rand McNally Bldg., Chicago.



*Hopewell thickness gage*



### Hopewell Thickness Gage

THE Hopewell thickness gage consists of a handle .030 in. thick, and seven leaves of the following thicknesses: .004, .006, .008, .010, .015, .020, and .025 in. The leaves are of various lengths so that when drawn out of the handle they lie against a scale which indicates their thickness. An imitation leather case is furnished with the set. The price is 75 cents and the makers are Hopewell Bros., Watertown, Mass.

### Clover Cylinder Lapping Tool

REBORING and the fitting of oversize pistons as a result of scored and out-of-round cylinders, it is stated, can, in a majority of cases, be avoided by the use of the Clover cylinder lapping tool. By hand, in a drill press or with a portable electric drill, the tool works equally well on any cylinder of the following diameters: 3 $\frac{1}{4}$ , 3 $\frac{3}{8}$ , 3 $\frac{1}{2}$ , 3 $\frac{3}{4}$ , and 3.775 in.

The tool consists of two lapping pads made of close grain, cast iron, and carefully machined to the cylinder size. These two pads are flexibly secured to an iron handle by means of a centering pin, and they are kept in an expanded position by two springs, so that during the lapping operation, constant pressure against the cylinder walls is assured.

Depressed areas are provided on each pad to receive the surplus accumulation of lapping compound and to properly redistribute it. By means of a cross handle, the tool may be used for hand lapping and, in addition, the lug, turned true with the driving pin, provides means for chucking the tool in a drill press for power lapping.

The Clover cylinder lapping tool, complete with one pair of standard 3.75-in. lapping pads lists at \$5. The same tool complete with oversize 3.775-in. pads also lists at \$5. Extra pads, standard or oversize per pair cost \$4. The handle with springs and wristpin which will fit all sizes of pads costs \$2.

The maker is the Clover Mfg Co., Norwalk, Conn. This company also makes a valve grinding and lapping compound.

### Adjustable Piston Vise

THE Tuthill adjustable piston vise is equipped with four lugs so placed as to divide the pressure equally on the piston, thus eliminating the possibility of springing it. Two lugs are movable so that the vise may be adjusted to any size from 2 $\frac{1}{2}$  to 4 $\frac{1}{2}$  in. The price is \$7.50. The maker is the Tuthill Sales Co., Kansas City, Mo.

### New York Coil Tester

TRoubles in the ignition system which are due to defects in the coil windings or condenser are located by the New York coil tester. The test set is contained in a substantial cabinet with nickel fittings. It may also be used for



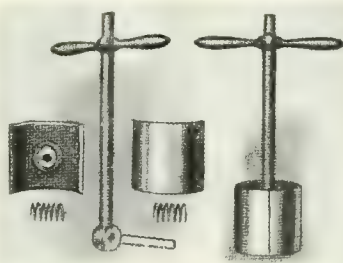
Durkee eye magnet



New York coil tester



Ready spring thread tool



Clover cylinder lapping tool

### Spring Thread Tool

THE Ready Spring Thread Tool incorporates the old goose neck principle to eliminate chatter and to enable the operator to cut smooth threads on all lathe work. The cutter is held at an angle of 15 deg., and the side angles are accurately ground so as to cut a perfect 60 deg. thread. The cutter, being held on the left side of the holder, enables the operator to work close up to a shoulder. The spring allows threaded work to be finished as nicely as with carbon cutters, and only high speed cutters are required, and threading can be done at high speeds, and at the same time get perfectly smooth work.

Notched teeth are cut in the back of the cutter, and in the front of the dog, the two being clamped together, with a bolt holding the dog to the tool holder, which overcomes any possibility of the cutter slipping.

An auxiliary spring, with a set screw, is incorporated in the holder, and by increasing the pressure on same, heavy pitches, such as four, six and eight can be cut just as smoothly as the finer ones, in which case, the auxiliary spring is released.

The top surface of the cutter, only, is required to be ground, enabling the tool to be used by inexperienced mechanics and still get a perfect thread. A Woodruff key in the bottom overcomes any tendency to side thrust. "V" cutters, as well as U. S. standard pitches and chasers, are carried in stock by the Ready Tool Co., Bridgeport, Conn., maker of the tool.

The price complete with one cutter is \$6.50. Extra cutters cost \$1.50 each.

### Durkee Eye Magnet

A SIMPLIFIED first-aid instrument for removing particles of steel and steel dust from the surface of the eye should have a special appeal to truck mechanics who are working in shops where steel and iron dust is in the air and where chips may fly. The Durkee eye magnet consists of a powerful electro-magnet which is light enough to be easily held in one hand and small enough so that the knurled grip permits the operator to handle the magnet with great ease.

A convenient support rests the weight of the magnet upon the operator's arm, leaving the fingers free to direct the magnet point. This point has been carefully designed to meet all the usual requirements of emergency work. It is not sharp enough to injure the eye and yet is small enough to be directed close to the tiny particles of iron and steel which must be removed. Close to this point a small flash lamp bulb is placed and wired so as to play a soft light directly on the injured eye. The magnet can be used independently of the lamp.

The complete outfit consists of the magnet, 6 ft. of cord, one plug to fit ordinary Edison lamp socket, two extra bulbs, and a dust-proof, leather covered case. The price is \$30, the sole distributors being Holz & Co., New York.

testing magneto armatures, and it works equally well on 6- and 12-volt coils. The price is \$20. The maker is the New York Coil Co., 338 Pearl St., New York.



# New Accessories and Parts

Lapeer Trailer — Easydump Body — Mutual  
Ford Wheels—Foley Rim for Pneumatic Tires

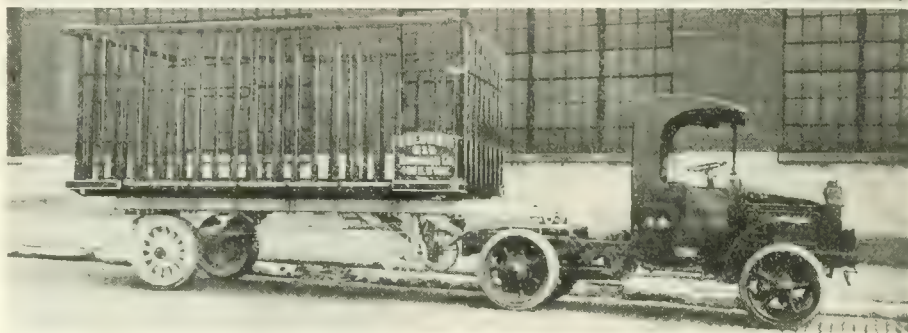
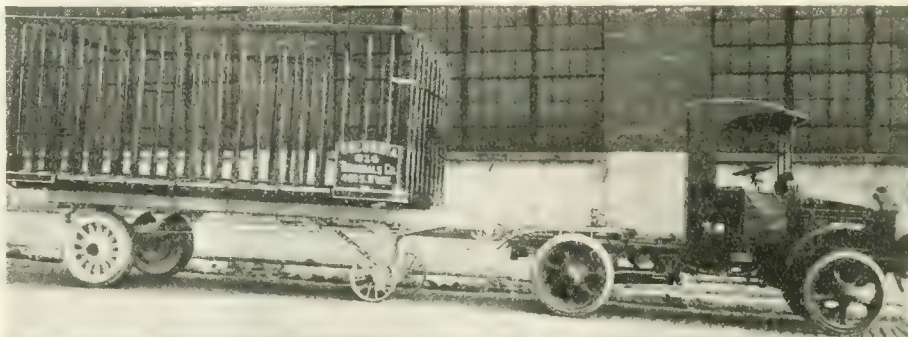
## Lapeer Trailer

ONE and one-half seconds to couple or uncouple is the record established with the new Lapeer trailer made by the Lapeer Trailer Corp., Lapeer, Mich. The new model has many interesting features in the way of improvements in design which have been effective in speeding up and easing the operation connected with coupling and uncoupling. Furthermore, the improvements in design have included the factor of safety during the time that the trailer is on the road.

All Lapeer semi-trailers are now equipped with internal-expanding drum brakes which automatically control the movement of the semi-trailer, preventing any possibility of overrunning of the tractor, whether descending a grade or making a stop on the level. The trailer brakes act independently of the tractor and are adequate to the full capacity of the pay load. The tractor can never become disengaged from its trailer without the trailer becoming a full-fledged four-wheeled trailer with brakes applied. This has been demonstrated in tests during which a loaded trailer was uncoupled going downhill at 15 m.p.h.

To couple a tractor to the trailer, it is only necessary to back the tractor under the front rollers of the trailer, and automatically the mobile leg support raises to road position, and simultaneously the coupling is performed. During these operations the brakes of the trailer are released.

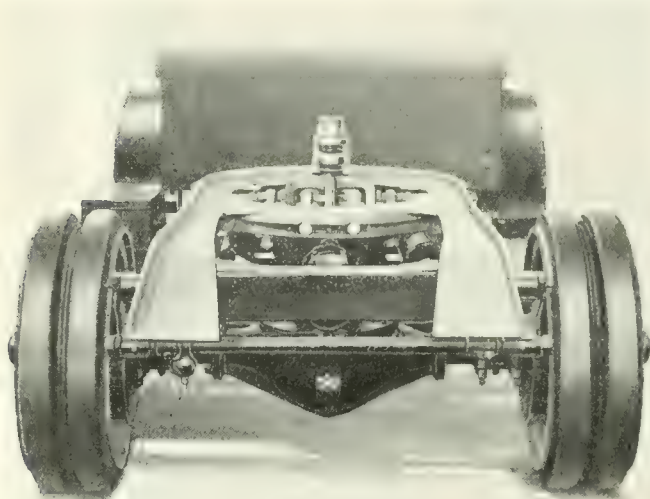
To uncouple from the new trailer, it is only necessary for the driver to pull up on a lever conveniently placed in



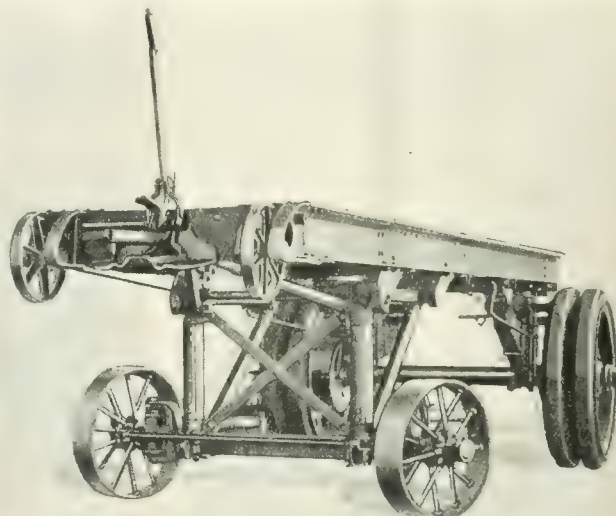
Upper—Lapeer trailer detached from tractor. Lower—View of Lapeer trailer when attached to tractor, showing the mobile leg support raised

the tractor cab, which unlocks the coupling, and drive away. The mobile support carrying the auxiliary wheels (of the same tread as the rear trailer wheels) lower to the ground, no matter what the ground level may be. During this operation, the brakes on the trailer are applied through a ball-bearing roller and cam mechanism.

The new coupling device embodies the floating member formerly employed, allowing the tractor to start  $1\frac{3}{4}$ -in. ahead of its load in all cases. The new coupling device, however, employs a pair of soft coil springs just ahead of the floating member, or king pin, which, upon being compressed, applies the brakes on the trailer automatically. In other



View of the tractor mounting as used with the new Lapeer trailer



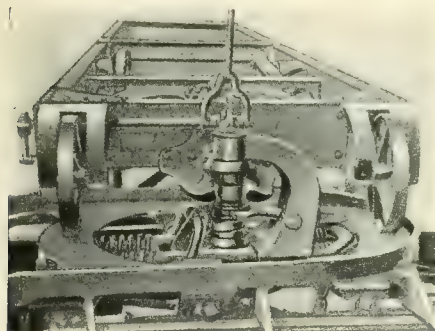
Lapeer trailer chassis as it appears when detached from the tractor



words, as soon as the trailer overruns the powerplant, whether descending a grade or making a service stop on the level, these springs compress and a bell crank operates a plunger through the floating member. This in turn operates the trailer brakes.

The lever shown on the front of the trailer chassis is never touched by the driver during the operation of coupling or uncoupling, but it is provided to release the brakes on the trailer when the tractor is not present, should it be desirable of pulling the trailer around by horse or other power.

The weights and prices of the various size trailers are as follows: 2-ton, 1,500 lb., \$600; 3½-ton, 2,140 lb., \$915; 6-ton, 2,350 lb., \$1,095; and 9-ton, 4,000 lb., \$1,535.

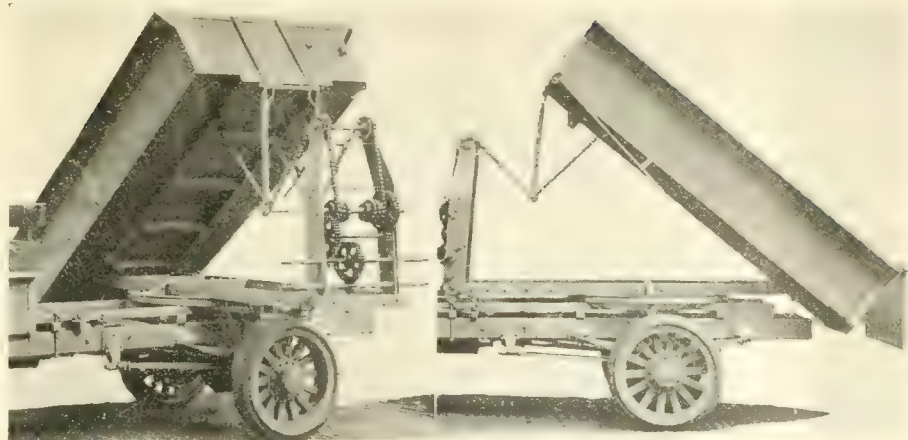


View of the new coupling arrangement on the Lapeer trailer

### Easydump Body

**S**IDE and rear dumping at any angle is possible with the Bruder Easydump body. The use of a turntable on roller bearings permits turning the body by hand either to the right or left. This type of body is especially recommended for unloading in close quarters, for road grading, etc. The hand-operated hoist is of Bruder design and is so constructed that the heaviest loads can be dumped with little effort in short time. The hoist is of steel construction to withstand the severest usage.

The bodies are made of wood or steel or wood with steel bottom. The wood bodies, in addition to having five standards on the outside, are reinforced with steel strapbolts on the inside, eliminating



The Bruder Easydump body tilted for side and rear dumping. Note the turntable

any possibility of getting out of shape. The steel bodies are equipped with two angle iron braces on each side. When desired, a tailgate, swinging from top or bottom, will be supplied. A double-operating tailgate may also be had.

The hoisting arrangement is of a special design and takes up only 8 in. of space in back of the driver's seat on a 1-ton truck, 10 in. on a 2-tonner, 12 in. on a 3-tonner, and 14 in. on a 5-tonner. Cut gears and a flat link steel hoisting chain are used.

Prices of the wood bodies range from \$370 for the 1-ton size to \$725 for the 5-ton size; for the steel bodies the prices range from \$390 to \$755. The hoist prices range from \$250 for the 1-tonner to \$475 for the 5-tonner.

The maker is Lawrence Bruder, 211-213 West Second Street, Cincinnati, Ohio.

### Mutual Ford Wheels

**S**TANDARD S. A. E. band wheels and demountable rim wheels for Ford trucks are being manufactured by the Mutual Wheel Co., Moline, Ill. The band wheels for solid tires are constructed with twelve 1½-in. spokes and 2¼ by 1½-in. wood rims. They are bored for hubs, but the hubs are not furnished. The demountable rim wheels are constructed with twelve 1½-in. spokes and 2¼ by 1½-in. wood rims. A complete set consists of two wheels with felloe bands, wrench, rim bolts and wheel

clamps. Three 32 by 4½-in. straight side Jaxon demountable rims are also included. The price of one solid tire wheel is \$10. Demountable rim wheels with full equipment cost \$30 a pair.

### Foley Rim for Pneumatics

**F**OLEY traction rims for pneumatic tires on 1-ton trucks have been placed on the market. The action of this type of rim for both solid and pneumatic tired wheels is automatic. On hard roads it does not come into action



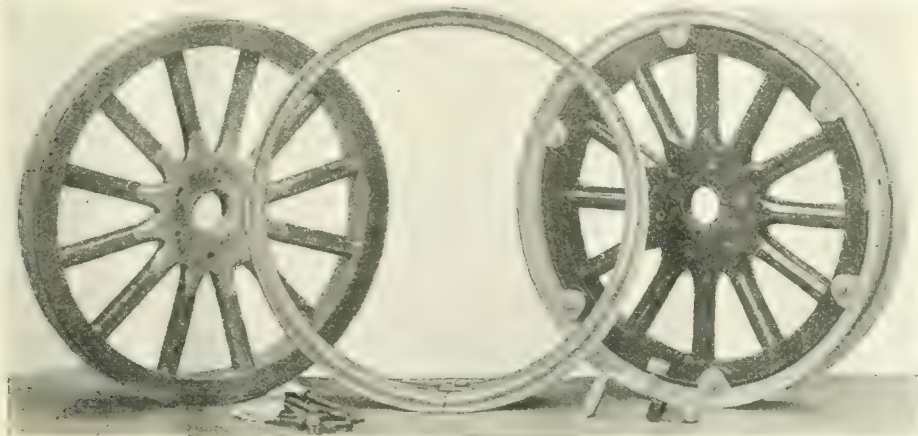
Foley rim for pneumatic tires

but as soon as soft roads are reached and the tire sinks into the ground the traction rim comes into use. Its extra surface bearing, which prevents sinking, together with the many traction lugs take hold so firmly that the drive wheels cannot spring.

In case of a puncture or a blowout a pneumatic tired truck equipped with this type of rim could be driven without danger to the casing or tube and the side wall of the shoe is protected from tearing when operating in rutty roads.

Foley rims are made in two styles, a split rim for the inside of the wheel and a solid rim for the outside.

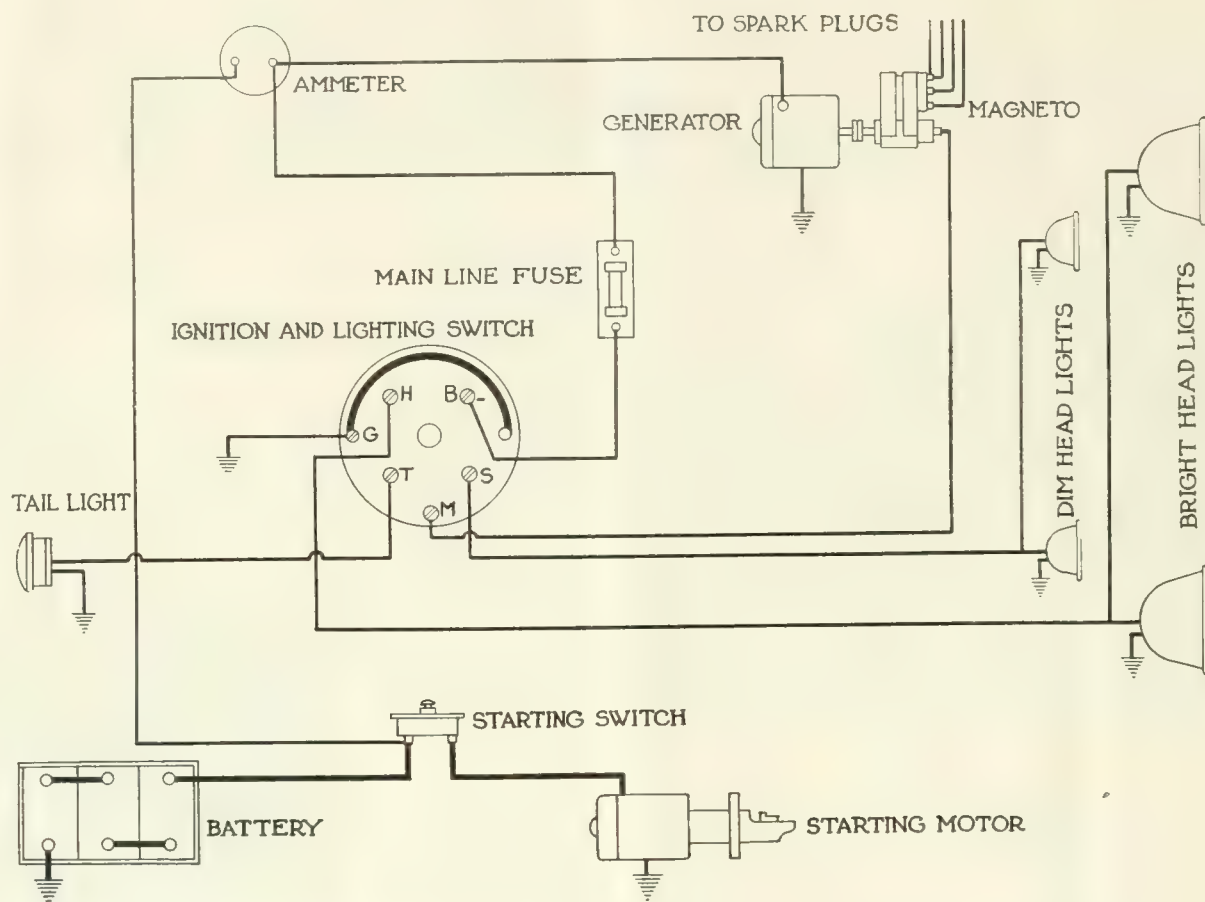
Provision is also made for the quick application of non-skid chains also furnished by the Foley Traction Rim Co., Minneapolis, Minn., maker of the rim. The price per set of four is \$50.



Mutual Ford wheels

# Motor Truck Electric System Wiring Diagrams

## 18—Starting and Lighting Unit on Sterling Trucks



### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE.

1920

1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting.....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15

1921

12—Maxwell, Lighting.....	Jan. 15
13—International, Starting and Lighting.....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 1
17—Reo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Apr. 15
19—Stewart, Starting and Lighting.....	Next Issue

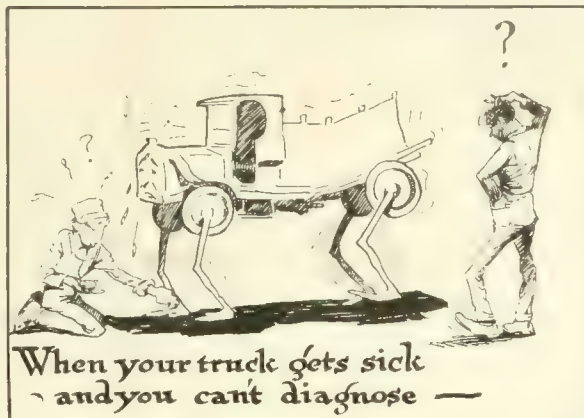
Typical schematic wiring diagram for the starting, lighting and magneto ignition on Sterling trucks, using the Westinghouse starting motor and generator.

As the successful operation of the battery depends upon the attention it receives, the following instructions should be carefully followed:

- 1—Keep battery securely fastened in place.
- 2—Keep battery and interior of battery compartment wiped clean and dry.
- 3—Keep all small articles, especially of metal, out of and away from the battery. Keep terminals and connections coated with vaseline or grease. If solution has slopped or spilled, wipe off with waste wet with ammonia water.
- 4—Do not use acid or electrolyte, only distilled water.
- 5—Fill battery with distilled water once every week in warm weather—every two weeks is considered good practice in cold weather.

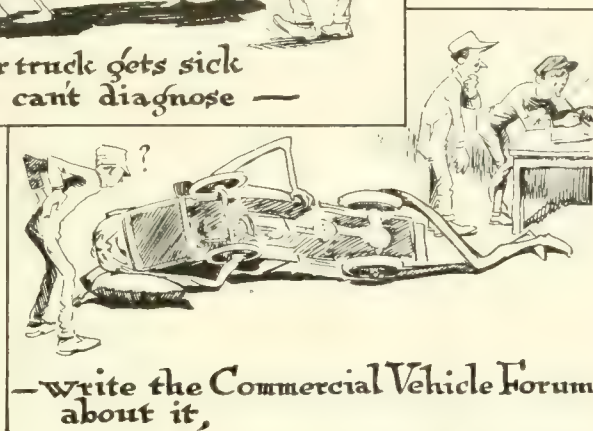


# Let Us Help Solve Your Problems!



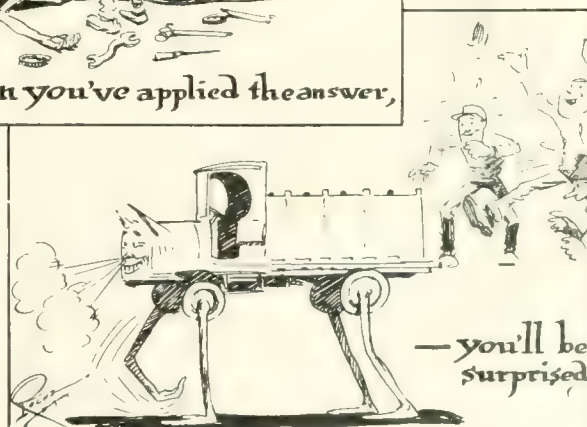
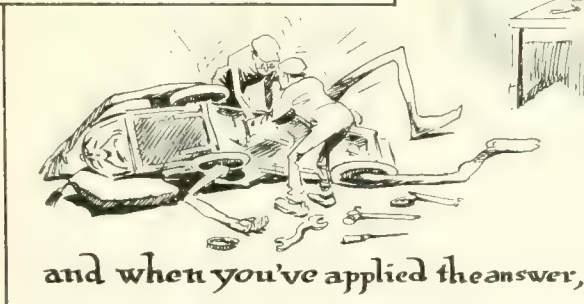
*The FORUM* Department  
of  
THE  
COMMERCIAL VEHICLE

Will Tell You What  
To Do—



*Why Not  
Use It?*

*If You Are Puzzled  
by Any Problem  
of Installation,  
Operation or Maintenance,  
Write to the Editor and  
Your Question Will Be  
Answered in the FORUM!*



**THE COMMERCIAL VEHICLE**

239 WEST 39th STREET

NEW YORK CITY



## Efficiency Percentage of Truck Arrived at Through Ton-Mile

To the Editor, COMMERCIAL VEHICLE:

Will you kindly give me chart or other system for arriving at efficiency percentage per truck?—E. L. DOOLAY, Cranbrook, B. C.

This is a very difficult problem to solve, as the actual efficiency of the truck depends not so much upon the truck itself as upon the way in which it is handled and the manner in which it is loaded and unloaded. The general meaning of the term "truck efficiency" is the ratio of the work actually done to the work which could be done. For example, if a 5-ton truck carried 5 tons out on the first part of every trip and 5 tons back on the return trip, and was in actual motion every minute of the working day, it would be said to be 100 per cent efficient. In actual truck work, the cost per unit of work done is the figure generally sought.

## Engine Idles Well But Dies or Misses Under Load

To the Editor, COMMERCIAL VEHICLE:

My engine idles well but misses or dies under a load. What does it indicate?—H. B. GRANT, Plainfield, N. J.

Missing when the engine is placed under load may be logically attributed to carburetor trouble. Very often clogging of the fuel line will not permit enough gas to get into the carburetor to insure perfect operation of the engine. It is also advisable to inspect the valve timing. If the engine is timed very late it may give in the action described but it is very probable that quite noticeable explosions will occur in the muffler.

## End Play in the Crankshaft and How to Detect It

To the Editor, COMMERCIAL VEHICLE:

How can end play in the crankshaft be detected by running the truck.—M. M., Bloomfield, N. J.

End play in the crankshaft may be detected by the thumping sound which occurs when the engine is running idle without load. The noise will be a heavy one in character. If the bottom pan of the engine is removed, the crankshaft may be moved from side to side by prying it with a small bar or screwdriver.

## Maker of Rail Carriage for Use on Passenger Carrying Trucks

To the Editor, COMMERCIAL VEHICLE:

Please furnish us the name of the maker that exhibited a Reo truck

**DEVOTED** to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

equipped for running on railroad tracks, at the New York Highway Transportation show in January.—W. S. CORBITT, Corbitt Motor Truck Co., Henderson, N. C.

The maker of this rail carriage equipment is J. Blaine Worcester, Middle-

## Service on Parts!

To demand the following:  
It is your right—

- 1—Quality, trade-marked truck spare parts.
- 2—Prompt and unfailing merchandising and delivery of parts.
- 3—Reasonable prices on parts, which shall be uniform to all.
- 4—Parts price lists on file in the owner's office and in the office where he buys parts.

(See Editorial—Page 202.)

## It Will Mean Better Business All Round

town, N. Y. A description of this outfit appeared on pages 6 and 7 of the Feb. 1, 1921, issue of THE COMMERCIAL VEHICLE.

## Corrosion at Battery Post and Its Cause

To the Editor, COMMERCIAL VEHICLE:

What causes the positive battery terminal and post to corrode? What is the name of this substance? Give remedy how to avoid and best method to clean.—R. BROWNE, Medford, Ore.

Corrosion is caused by the action of the heavy battery acid on the copper in the terminal, forming copper sulphate. The remedy is to keep the top of the battery clean and dry and to coat the terminals with vaseline before putting on.

## Increasing the Compression on the Ford Engine

To the Editor, COMMERCIAL VEHICLE:

What results can be obtained by dressing 1/16 in. off the face of the Ford cylinder head? Would it impair the performance of the engine or would it give more speed and power?—J. SCHEERER, New York City.

Removing a small amount of metal from the face of the cylinder will reduce the compression space and naturally increase the compression. This will result in an increase in the power and speed. An increase in compression can also be obtained by installing pistons with a higher crown. The Ford cylinder heads have not always been the same. A few years ago the Ford cylinder heads were not as deep. If one of these older type heads is available it can be installed to advantage. The compression can be increased to about 70 to 75 lb. by any of the above outlined methods.

## The Difference Between a Radial and Thrust Load

To the Editor, COMMERCIAL VEHICLE:

What is the difference between radial and thrust loads?—F. MILLER, New Haven, Conn.

A radial load is a pressure or load perpendicular to the shaft supporting the load. For example, the wheel bearings of a truck when running on a perfectly level road are subject to radial loads.

Thrust loads or pressures differ from radial loads in that they are parallel to or in direction of the shaft. When a truck strikes a curb a thrust load is imposed on the bearings in the wheels, that is, to the side or endwise.

## Motor Truck That Earned Its Way Across Country

To the Editor, COMMERCIAL VEHICLE:

What was the name of the truck and its driver that was driven across the continent to prove the earning power and number of usages to which a motor truck could be put profitably?—R. CORNEILLE, New York City.

Harold T. I. Shannon drove a standard 1½-ton Oneida truck from Green Bay, Wis., to Seattle, Wash., the driver and his mechanic starting without any money. They reached Seattle 83 days later with \$500 in hand. This was earned through moving houses, carrying ore, transporting live stock and in doing various other odd jobs where a penny could be made.



## Governor Adjustment on Sterling Truck Engine

To the Editor, COMMERCIAL VEHICLE:

Please instruct me on how to adjust the governor on my Sterling truck engine.—E. MCCARDLE, New York City.

The governor is set and sealed at the factory so that the engine revolves at about 1000 r.p.m. with the hand or foot accelerator throttle wide open. Adjustment of this governor by anyone other than the authorized representative of the Sterling company voids the warranty.

The operation of the governor is as follows:

Two circular weights back in the case behind gear O shown in the accompanying illustration are held by and swivel about the two pins marked K. These weights fly out at speed, moving part A outward. This action presses the ball bearing thrust contained in retainer B outward in proportion.

The lever D swivels on fulcrum C. The movement of A causes a movement of rod R in direction indicated by arrow. The movement of rod R closes valve H which is of the butterfly type and swivels on shaft S.

The adjustment for speed is made by turning screw L. Turning L in direction directed by arrow causes engine to speed up, while turning in reverse direction causes to slow down.

The governor is locked by locking nut G. It is then sealed by passing a wire through the hole in the spring housing and through the hole in the nut G.

F is a spring, the tension of which governs the speed of the engine.

If the engine stops suddenly the butterfly valve in the intake manifold may have moved to a wrong position. With the engine standing idle this valve should be on an angle to allow the gas to enter the cylinders.

## Adjustment of Magneto Shaft on Vim

To the Editor, COMMERCIAL VEHICLE:

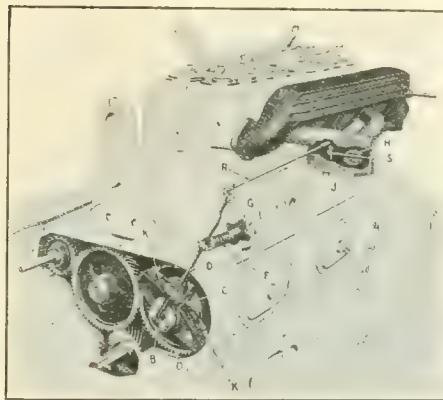
Please give instructions on adjustment of Vim magneto shaft.—C. J., Brooklyn, N. Y.

On the front of the timing gear cover, directly in line with the magneto shaft, is a threaded thrust screw and lock nut. The function of this screw is to take up the endplay in the magneto shaft and at the magneto couplings. When this thrust screw is adjusted properly, there should be about .002 of an inch play between the magneto couplings. If this adjustment is too tight, undue strain would be brought to bear against the bearings in the magneto; care must also be taken that the fan belt drive pulley on the magneto shaft is not adjusted too tight against the bushing in the case.

## Coal Gas as an Engine Fuel—Its Practicability

To the Editor, COMMERCIAL VEHICLE:

Some time ago I believe I read that motor vehicles were using coal gas as a fuel instead of gasoline and would like to know where this was done. Was its use



Location of governor adjustments on Sterling truck engine

practical and if so, is it being continued?—M. TODD, Chicago.

During the war numerous heavy vehicles in Great Britain were operated with gas contained in collapsible bags. According to information, the use of coal gas is likely to continue, but flexible containers will be generally superseded by rigid and semi-rigid containers.

Semi-rigid containers when made of rubber and canvas are declared to be unsatisfactory, but when consisting of an inner rubber bag suitably restrained by an outer member of woven steel wire with metal end plates, they appear to be sat-

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

Make use of it.

The editors will be glad to answer any questions which you ask.

## Answers

isfactory for internal pressure not exceeding 45 atmospheres.

The time, it is stated, has now come to approve and encourage the use of metal cylinders made of carbon with certain alloy steels, which can be safely employed for working pressures up to 2250 lb. per square inch. Wire-wound metal cylinders, with removable ends held in place by screwed tension rods, are stated to lose gas at the joints after the earlier stages of discharge, and to be heavier for any given volume of gas than plain cylinders of high-carbon or alloy steel.

Subject to the adoption of simple precautions, there is no risk of explosion with town gas during its compression into the cylinders or its use from them. The cost of compression, including maintenance of compressor plant, storage cylinders, and vehicle cylinders, with interest and depreciation, will vary between 40 to 75 cents per 1000 cu. ft. of free gas, according to quantity and working pressure adopted, but the total cost may be taken as being equivalent on the average to 11 cents per U. S. gallon on any gasoline replaced.

## Reader Wants Information on How to Solder Aluminum

To the Editor, COMMERCIAL VEHICLE:

Is it possible to unite two pieces of aluminum by soldering or brazing?—C. S. W., Cohoes, N. Y.

Yes. For soldering, the surfaces must be rubbed down with emery paper with a small quantity of vaseline. The flux may be made up as follows, according to a prescription given by the Soldering Association: Lithium chloride, 15 per cent; potassium chloride, 45 per cent; sodium chloride, 30 per cent; potassium fluoride, 7 per cent; bisulphate of soda, 3 per cent.

The joint should be carefully brushed and washed in hot water to remove all traces of the flux. For brazing, metals such as tin, bismuth, cadmium may be used. The process should, however, be used only in exceptional cases.

## Action of Condenser in Ignition Circuits

To the Editor, COMMERCIAL VEHICLE:

Will you please explain the action of the condenser of an ignition outfit. I know that the condenser holds down the sparking at the interrupter points by absorbing the induced current at the moment of break, but am wondering whether it increases the efficiency of the coil by helping to increase the voltage in the secondary by its discharge. It seems to me that the high tension current has been produced by the sudden stoppage of the primary current before the condenser has time to discharge and set up a reversal of current and polarity. This discharge therefore has no effect upon the voltage of the secondary.—R. FOWLER, Plainfield, N. J.

Without a condenser in the primary there would be no secondary spark at all, or at best only a very short one. Therefore the condenser certainly adds to the efficiency of the secondary circuit. The magnetic field of the coil represents the store of energy which is converted into a spark. In order that a spark may be produced it is necessary first of all that a sufficiently high voltage be induced in the secondary winding of the coil to break down the dielectric resistance of the spark gap. The voltage induced in the secondary depends upon only two things, namely, the number of turns in the secondary winding and the rate at which the magnetic field within the winding dies out. It is the rate of dying out of the magnetic field which is affected by the condenser in the primary.

The primary current sustains the magnetic field. When the interrupter opens the circuit the resistance becomes instantly almost infinite and the current declines in value. As a result the magnetic field begins to die out. But as this occurs there is an inductive action on both the primary and secondary windings. The voltages induced in these windings will be proportional to their respective numbers of turns and to the rate of decline of the magnetic field. The direction of the induced electromotive force in the primary winding will be such as to keep the current going in that winding, and if no condenser were used a heavy spark would be formed at the breaker



points, which simply means that the current continues to flow for some time, decreasing gradually. But with a gradual decrease in current there will be low rate of dying out of the magnetic field and hence a low secondary voltage not able to break down the spark gap and create a spark. On the other hand, if there is a condenser shunted across the interrupter the conditions are entirely different.

The simplest explanation of how the condenser prevents sparking and insures a high secondary electromotive force is to say that it neutralizes the self induction of the primary winding. This self induction is very similar in its effect to mechanical inertia, that is, it tends to prevent the current in a circuit from rising when the electromotive force is increased and from dropping when the electromotive force is decreased. The last case is that occurring in the primary circuit. When the interrupter points open the impressed electromotive force drops to zero but the self induction tends to keep the current going.

A condenser has the opposite effect, for on increase of the electromotive force there is a flow of current into the condenser in direct proportion to the rate of increase in electromotive force. Therefore, it is possible by means of a condenser to neutralize the self induction of the primary circuit and insure an almost instantaneous cessation of primary current upon the opening of the interrupter points. This insures a high secondary voltage and consequently a sure spark.

## Sticking Valve May Be Due to Play in Guide

To the Editor, COMMERCIAL VEHICLE:

I have been unsuccessful in getting a good adjustment of my carbureter and have strong suspicions that my valves are not seating properly, notwithstanding the fact that they have recently been ground. Where should I look for this trouble?—J. W. SCOTT, Dover, N. J.

You should see whether your valves are sticking. They may be bent, gummed, or carbonized. The trouble may also be due to other displacements, such as a badly worn valve stem guide, which also may cause a good deal of other trouble.

In the first place such a condition will not permit the valve to seat properly; it is difficult accurately to grind the valve to a seat and it is almost impossible to adjust the carbureter owing to the excess of air that will be drawn through the guide and past the valve stem.

In ascertaining whether there is a sticking valve, look first to the valve guide and see that there is no excessive play between the stem and the guide, for if there is the valve stem is apt to bind at two points, the top and bottom of the guide on opposite sides, as shown in the accompanying illustration.

If it is impossible to secure valves with oversize stems, then bush the guide and ream out the hole until it is true so as to make a close fit for the valve stem after the latter has been ground for perfect trueness. Fitting of only one valve, however, is not advisable.

## How to Make Up Battery Electrolyte With Gravity of 1400

To the Editor, COMMERCIAL VEHICLE:

I would like to have information on how to obtain the ordinary battery electrolyte with a gravity of 1400. What is really meant when a cell tests 1275? Does the positive or negative side of battery receive the charge from the generator? Why do they undercut the mica on the generator commutator? Why do they never undercut the mica on commutator on the starter motor? What happens when the liquid in the battery cell is allowed to expose the plates?—R. SPRYER, Buffalo, N. Y.

You can obtain the ordinary battery electrolyte with a gravity of 1400 by adding to each ten parts of chemically pure sulphuric acid, with a gravity of 1,835 and 15 8/10 parts of distilled water by volume.

When a cell tests 1275, it means that the electrolyte has a density of 1.275 as compared to pure water.

The common explanation is that the current in a circuit passes from the posi-

## Profits and Losses

Have you ever analyzed the expense incurred through breakdowns of your trucks?

Read Mr. Parker's letter in which he tells how to make profits in truck operation.

The Forum Dept. is open for discussion, so let's hear from you.

tive of the source through the circuit to the negative of the source. This would make it travel from negative to positive inside the source of electrical energy. While the generator is charging, it is the source of energy and the battery then would receive current at the positive terminal.

The mica is undercut on a generator to

compensate for the greater wear of the copper commutator segments.

On a starting motor the brushes are hard enough to keep the mica cut down flush with the copper.

The parts of a battery plate not covered with electrolyte cannot function and as a result of being exposed to the air, become useless. It also throws all of the work on the remaining parts that are submerged, overworking and damaging the entire plate.

## Reader Discusses Motor Truck Profits and Losses

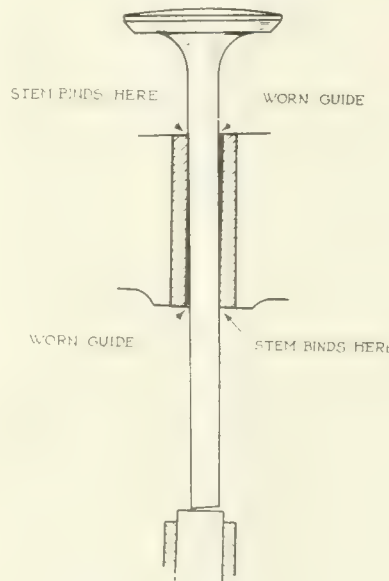
To the Editor, COMMERCIAL VEHICLE:

It is of material importance to motor truck owners that they become familiar with certain never failing data that may be relied upon to consummate a considerable saving of money, with relation to the necessary expenses of laying the truck up for repairs.

For instance we will use an average and say a 3½-ton truck is worth \$2.50 per hour, and we are confronted with a breakdown that requires a loss of 3 days. Therefore 3 days x 8 hrs. per day x \$2.50 per hr. means \$60. And 40 hrs. of repair expense at \$1.25 per hr. equals \$50. New parts installed in consideration with the other expenses mentioned average \$60. Therefore, a total expense of \$170 is the result.

A 3½-ton truck traveling at an average distance of 6 miles per hour costs approximately, all costs included, \$1.40 per hr. to operate. At a worth of \$2.50 per hr., minus an operating expense of \$1.40 per hr. leaves a net profit of \$1.10 per hr., or \$8.80 per 8-hr. working day. Now with an expense of \$170, it means that a month's working time is required to pay the truck even with itself to the time when it was laid up for repairs. Careful consideration of these facts is important for the reason that they represent an average and the total might have been avoided by more care in driving. For a breakdown of the same degree of seriousness may result by the mere carelessness of crossing a street crossing.

Therefore, a reason is offered why many motor trucks are operated with a final showing of small profits. Questions that have often arisen and have borne important relation toward the operation of motor trucks may be enumerated as follows: Motor truck drivers should be trained to carefulness. They should be efficient in repairing and understanding the mechanism of a truck. They should be given facts concerning the necessary care, above all things, in driving slowly when overloaded. It is certain a 3½-ton motor truck is built to carry 3½ tons at a speed of 12 m.p.h., to avoid the least possible chance of damage to the truck when loaded with 4½ tons, the speed must be reduced to a maximum of 8 m.p.h. Governors may be depended upon to assist in increasing the profits in operation of a truck, but the matter of coasting down hill is another question, which may only be controlled by the driver of the truck. Is speed in moderation to be relied upon to



What happens to the valve stem when the guide is worn



secure greater profits? That is also a question to be determined entirely by the driver. Speed even in extreme moderation over rough cobble stones, for instance, represents a loss of money. Skid chains should never remain on the wheels except when absolutely necessary. Solid tires in conjunction with the extra heavy chains necessary produces vibration of a damaging character not only to the mechanism of the truck but also to the tires. Damage to the differential is not infrequent when chains are attached at irregular intervals or other than straight across the periphery of the wheel. Thorough truck inspection once every 30 days costs a little but saves considerable.

Fast driving with the idea of producing greater profits may be compared with the traveling salesman who, heavily laden with two suit cases, ran to catch an already moving train at 9.00 A. M. He received a fall resulting in the necessary attention of a physician for 3 weeks. He might have acted more sensibly and slowly. He could have made the 12.00 o'clock train with a loss of but 3 hours.—L. TORRIE PARKER, Cincinnati.

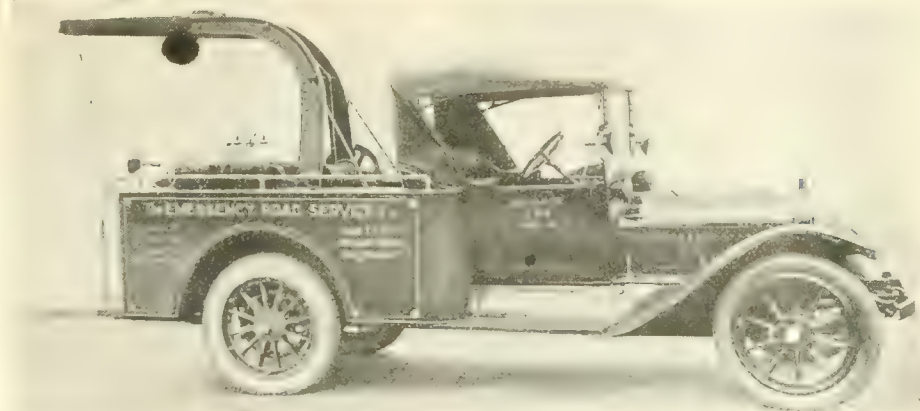
## Reader Has Some Good Ideas on Radiator Boiling

To the Editor, COMMERCIAL VEHICLE:

Boiling of water in the radiator is often called overheating. But it would, perhaps, be better to use the word overheating to denote actual excessive heating of the engine. This condition may exist with or without boiling of the water in the radiator.

If the water boils the first thing to do is to make sure that everything else is O. K. Even a slipping fan belt or a break in the belt need not cause delay on the road, though in hilly places where there are long first and second gear grades, a properly working fan is necessary.

Steam blowing out of the radiator may indicate one of several things. If the trouble appears suddenly it is probably due to impeded circulation of the water. The inside rubber lining of the water hose may come loose or the pump may have stopped. Such troubles are indicated by the water being boiling in the top of the radiator and cool in the bottom. In such cases it is possible to



*This car has been designed for roadside repairs on trucks and is fully equipped for every emergency*

get to your place of business if the radiator can be kept full of water.

Driving with the spark retarded too long is a common cause of overheating.

A too rich mixture is sometimes responsible for overheating but a too lean mixture is even worse in this respect. A mixture too lean is a slow burning one. After a spark at the plug starts combus-

heads causes overheating. The sign of too much carbon is a knock when the throttle is opened.

Overheating from lack of oil has a way of making itself known. The dry metallic knocking of the engine under load, the lack of power and very shortly the bang of burned out bearings are things to be remembered.

If the radiator and water jackets are clogged with scale both boiling and overheating may be expected. Washing soda dissolved in hot water and used in the radiator for a whole day of service was found helpful. Putting a quart of kerosene in the radiator and draining off the water slowly has also been used with success by this company.—PAUL H. KOENIG, Scudders Gale Grocer Co., St. Louis, Mo.

## Radiator Boiling

One of our readers has sent in some very good ideas on the prevention of radiator boiling.

Read his letter and give us your views.

Any other suggestions along the lines of maintenance that will help fleet superintendents will be read with interest.

Let's hear from you.

tion of the charge it should be completed almost instantly. But if the mixture be too lean the burning keeps on and the gas in the top of the cylinder may still be burning when the inlet valve opens. If so, the pop pop noise tells us what is wrong.

Carbon on the pistons and cylinder

## Reader Designs a Service Car with Some Good Features

To the Editor, COMMERCIAL VEHICLE:

We are enclosing photograph together with description of our new service car.

This car is of a special design and is equipped to handle any emergency that may arise with the truck driver while on the road. The demands on our own service system have aided very materially in the perfection of this model. The equipment includes a 5-ton crane, 500 ft. of heavy wire cable, dolly truck, towing poles and lines, gasoline, air and oil tanks, acetylene and oxygen outfits for welding and decarbonizing, a battery of heavy searchlights, mounted so as to facilitate work close up or at a distance. Compartments and drawers are provided for a full complement of tools, telescoping slide benches, mounted with emery wheel and vise. All tank outlets together with air hose, oil measures, etc., are located in separate compartments on both sides of the car. The crane easily handles any size of truck and with a special carrying saddle on the rear platform makes it possible for one man to handle any kind of towing, without any further assistance.

Bodies will be mounted on  $\frac{3}{4}$  and 2-ton chassis, carrying crane. Smaller models of same design will be without crane.—THE EMERGENCY ROAD SERVICE Co., Cleveland, Ohio.



*Three to 5 ft. of water failed to hamper this fleet of Fageol trucks near Oregon City, Ore. The second truck with its nose in the back of the first and its engine clear of the water is the one delivering the power*



## *The Truck Owner Will Decide the Parts Service Question*

SO far as the question of service on truck units and unit parts is concerned, fleet owners all over the country have not been getting adequate or satisfactory service on truck units and unit parts, either as regards prompt delivery or service in installation.

What is more, in a great many instances they have been overcharged for new parts when they did get them. And they have also been overcharged for the labor involved, if the new parts were installed elsewhere than at their own garages.

The fleet owner does not know why this is. He has not gone into the question at all.

But he does know that he is not getting either the kind of service on parts that he ought to get—or enough service of any kind, on parts.

And he wants good service and plenty of it—immediately, if not sooner.

He does not *care* what is wrong. He wants results.

At the present time no one can prophesy exactly how he is going to get this satisfactory service. But if he makes his wants known, in no uncertain voice, he *will* get it. And the more insistent he is on the point the sooner he will get it.

There is a reason. The fleet owner is the ultimate consumer. He is the man for whom everybody else is in business, to whom everybody else is catering and whom everybody else is trying to please and satisfy.

If he keeps still and takes what he can get, everybody else will take it more or less for granted that he is satisfied.

But if he sits up and registers disapproval everybody else is going to get busy and do a lot of stirring around until he can be made to smile again.

For it is the fleet owner from whom the money comes!

Now there are four things that the fleet owner is not getting—four things that he ought to be getting—four things that he has a right to demand.

The first of these is **QUALITY, TRADE-MARKED SPARE UNITS AND UNIT PARTS**. This means that the fleet owner wants spare units and unit parts that are reliable—and he wants the trade-mark on

them to prove that they are reliable, because the maker puts his name on them and stands behind them.

The second thing he wants and has a right to demand is **PROMPT DELIVERY**. He wants to make money on his trucks. And if a truck is tied up, it is losing money instead of making it. And if a truck needs a new spare part, it is tied up until it gets that new spare part.

The third thing he wants and has a right to demand is a **UNIFORM, REASONABLE PRICE** on spare parts. He does *not* want, as in the past and at present, to have the same part selling for nine different prices in nine different places—and many of the prices too high. He wants a square deal—and he does not want to have to look all over town to get it.

Lastly, he wants to be able, and he has a right to make the demand, to **FIND A COMPLETE PARTS PRICE LIST ON FILE WHERE HE BUYS HIS PARTS**, for he wants to be able to check up and find out whether he is getting his spare parts at a fair price or not.

That is what the fleet owner wants. And that is what he will get if he makes his wants known.

For he is the man who pays for the goods—and he is the man who will ultimately decide the question of adequate service on truck units and unit parts.

### **Store Door Delivery** ✓✓

Former Governor Alfred E. Smith of New York believes that through shipments of freight from the producer to the store door of the consumer will be the solution of present congested city traffic problems.

He also believes that a mutual garage plan for business houses in congested districts will help solve the congested terminals problem.

These things apply to big cities. They apply to fleet owners in big cities. And they apply to you and your city. Bear this idea in mind. And see that your local authorities bear it in mind and that your legislators know your wants along these lines and take action to meet them.



# Parts Service Plan Meets Opposition

## Truck Assemblers Do Not Want Units Station System —Fight Threatened

DETROIT, April 2.—Bitter opposition to the direct parts servicing plan proposed by prominent unit parts manufacturers and under which they proposed eventually to cover the entire country with a chain of service stations, was displayed by members of a committee representing the Motor Truck Manufacturers Association at a meeting here on March 29. The conference was called to discuss the plan and make recommendations to the association.

At the close of an all day session at which several representative truck manufacturers were heard, a resolution was adopted to be presented at a meeting of the membership of the association to which parts makers and others interested will be invited. This meeting will be held April 12 at the Detroit Athletic Club.

The text of the resolution will not be made public until after it is presented at this meeting but it can be stated that it expresses strong and unalterable opposition to the plan as being detrimental to the interests of the truck manufacturer, dealer and distributor as well as to the parts manufacturer.

The resolution was adopted by unanimous vote of the committee which was composed of B. A. Gramm, chairman; J. W. Stevenson of the Indiana Truck Corp.; M. Cook, General Manager of the Service Motor Truck Co. and Otto Armleder, president of the O. Armleder Co.

Recognizing the fundamental right of the owner to demand parts standardization, prompt service and reasonable costs, and admitting the present condition of the truck industry is due to woe-ful lack in that regard, members of the committee and other executives insisted it was not the function of the parts maker to attempt to remedy the existing evils but a duty up to the manufacturer.

Declaring their views represented the opinion of 90 per cent of the truck assemblers, members of the committee described the parts station plan as a "selfish and arrogant attempt" of the parts manufacturers to take advantage of conditions. They declared the plan, if permitted to operate, would strike at the very heart of their business in that it would put a premium on the curbstone dealer and the mushroom manufacturer and drive the legitimate manufacturer with heavy financial investment into bankruptcy.

The man who wanted a truck under such conditions, it was asserted would simply go to the parts depot, secure the necessary units, purchase blueprints and build his own truck.

"That is our greatest objection," said one member of the committee. "The fact that 20 per cent of our profit comes from the parts and service end, which

necessarily would be eliminated, is but a minor consideration."

Back of all of the discussion, however, stalked the ghost of the owner demanding prompt, efficient and reasonable service coupled with the fact that more than thirty major parts depots now are functioning successfully. Committee members, while very willing to speak freely with regard to the action to be taken to check the progress of the plan, would not speak as official representatives of their organization. They declared it would be their plan to go to the parts manufacturers participating and demand that they renounce affiliation with the group participating and in the event of refusal, simply cancel contracts and cease to do business with that manufacturer.

It was even suggested unofficially that truck manufacturers go to the parts makers in a body and make the demand, holding out the threat of establishment of co-operative parts manufacturing concerns or diversion of their business to independent concerns now existing. No action was taken however, on this proposal.

Parts makers interviewed after the meeting did not appear perturbed by the veiled threat. They take the position that the owner is the man who must be satisfied and they declare that the owner is going to demand the standard parts now being marked in his car or truck. They assert that when a man contemplates a purchase, no matter how little he may know about the automobile or truck, the first thing he is going to ask is regarding the make of engine, axle, clutch, gears, etc., and that he is not going to buy the car or truck that is not built of standard and well known units.

## Plan Special Clause on Rebuilt Motor Trucks

WASHINGTON, April 2.—It seems quite likely that the House Committee on Ways and Means will insert a clause in the proposed anti-dumping law which will effectively block English and French exporters from selling rebuilt trucks and cars of American manufacture on local markets at prices below production costs. Ample protection will be given domestic producers from all forms of foreign competition. This bill must originate in the House.

## Rail Rates to Boom Trucks

BOSTON, April 2.—The great inroads of the motor truck upon the business of the rail carriers will be further extended if the proposed 10 per cent increase in rail rates goes into effect, representatives of the manufacturing interests told the Governor's Committee on Railroads which is considering the proposition recently suggested by the roads.

N. A. Davis, speaking for the wool trade of Boston, declared there are 46,000 motor trucks already in Massachusetts in active competition with the railroads with the result that the rail carriers are losing business heavily.

# Detroit to Open Its First Truck Depot

## Lower Produce Prices Expected With More Flexible Transportation

DETROIT, April 13—A cut in retail prices of farm produce in this city may be expected as a result of the building this spring of Detroit's first union motor truck freight depot.

This prediction, made by William Seitz, managing the enterprise, is based on figures from Minneapolis, Minn., which has a similar depot, by which transportation charges on foods shipped in from the farm were halved.

A large part of the farm produce now sold in Detroit is brought in by express. This is an inefficient way of handling it, according to Mr. Seitz, when compared with the more flexible and cheaper motor truck system of transport which is scheduled with the new depot as a center in Detroit.

The unit depot, construction of which is to be started in a short time, is designed to take care of all the motor transport lines now running into this city. It will be the first of three projected units to be constructed as the transport business expands.

Shippers are inconvenienced by not knowing where to send their goods for the quickest service. With all lines running on established schedules into a common depot, a radius within 125 miles of Detroit will be served much more quickly and at less cost than by the present methods.

Three classes of service are planned: The fast express which will carry rush package freight between the various cities in the system, the "loco service" which will make stops at farms and small towns on its route, carrying in food products, and the through freight for heavy trucking which will unload at the door of its consignee.

## Complain Against Higher Motor Truck Fees

ALBANY, N. Y., April 9—A memorandum in opposition to the Lowman bill increasing registration fees on motor vehicles because it discriminates against the heavy duty trucks has been circulated among the members of the State Assembly by the Motor Truck Assn. of America.

"This bill is apparently based on the supposition that the trucks of large carrying capacity are more destructive to highways than those carrying smaller loads," is stated in the memorandum. "Science and experience have both demonstrated the fallacy of this premise. The motor truck is so constructed that by means of increasing the width of the tire, the weight per square inch of bearing surface on the highways is no greater in the case of heavy trucks than in that of light trucks."



## Store Door Delivery a Success

### "Container Car" System Used by New York Central Will Be Expanded

NEW YORK, April 4.—Preliminary experiments with its new "container cars" for store door delivery have been a complete success, the New York Central Railroad announces, and the system will be expanded as rapidly as possible.

The freight car, with four portable containers which can be filled and sealed by a shipper in his own warehouse and then loaded on the car truck, has just completed successful trips between Chicago and Cleveland, and a second car of this type will be tried this week on the Boston & Albany for the shipment of shoes. A steel express car, with nine portable containers, has finished successful trips between this city and Chicago.

Experts of the New York Central consider their experiment a radical departure in transportation. It is predicted that wide use of the new car will save not only demurrage and truckage, but clerk hire and large losses by theft.

The new system provides "compartment" service for freight and express, by means of specially-devised "containers" and "container cars," which in effect gives to shippers the use of individual traveling safe-deposit vaults of various standard, interchangeable sizes which are carried locked and intact from the door of the sender clear to the door of the receiver of freight. The "containers" or huge steel boxes, are readily removable from the car body and are packed and locked at the factory of the shipper, carried by motor truck or electric car to the railroad and hoisted aboard the car, and at destination are carried by truck to the store door of the consignee, where they are unlocked and unloaded at convenience.

### Great Savings Effectuated

Goods may be stowed in the "containers" in cardboard or even paper wrappings, without need for costly wooden boxes or crates, and the shipment travels untouched to the door or platform where the packages may be unloaded directly onto shelves. Numerous handlings and rehandlings—from factory to truck, from truck to freight station or warehouse, and by hand-truck from platform into box-car—are eliminated completely, as well as repeated tallying and checking for accounting at each step in the process of handling the packages separately at both origin and destination.

"The savings effected by the new system in loss and damage of freight prevented, in wages, in boxing and crating of individual small shipments," says the New York Central, "are expected to be exceeded in amount by the greater use of moving equipment—railroad cars, trucks and drays as well as of freight-terminal facilities, whose limits of ca-

capacity in periods of heavy demands for transportation have restricted the size of the 'peak-load' and adversely affected commerce."

## Open Truck Appraisal Bureau

NEW YORK CITY, April 2.—The Metropolitan Dealers Motor Truck Exchange, Inc., a co-operative trade organization has opened an automobile appraisal bureau, in which service comprising inspection and appraisal of used trucks is offered the owners of the territory. The organization has offices at 1819 Broadway, New York, in charge of C. H. Corey, Manager.

## Moreton Elected President

GRAND RAPIDS, MICH., April 6.—E. Foster Moreton of Detroit was named president of the Michigan Highway Transportation Association which met in convention here this week. Sixty commercial truck operators representing fifteen counties attended the convention. It was brought out during the meeting that approximately 10,000 trucks are in use in Michigan besides 2500 buses and 1500 teams engaged in commercial hauling.

It is the plan of the association, which was formed as a branch of the National Team & Motor Truck Owners Association, to stabilize the commercial hauling industry, to co-operate with state and local officers in regulating loads on highways and to stabilize rates and prevent illegal practices in the sale of trucks.

## National Highway Convention

DETROIT, April 11.—The National Highway Traffic Association will hold its 1921 convention at the Detroit Athletic Club, on April 29. The following list includes some of the important subjects pertaining to traffic regulation and efficient and economic highway transport which will be discussed:

Interrelationship of Highway, Railway and Waterway Transport; Traffic Limit Lines on Roadway Surfaces; Design of Curves at Street Corners to Facilitate Traffic; Highway Transport Clearing Houses; Regulations Covering Speeds, Weights and Dimensions of Motor Trucks and Trailers; Regulation of Overloading of Motor Trucks; Traffic Center Lines on Roadways; Relation of Impact Forces on Pavements of Resulting Impact Forces on Vehicles; Status of the Construction of Highway Curves and Recommended Practice to Increase Safety to Traffic; and Highway Transport Franchises.

## F. W. D.'s Price Lowered

CLINTONVILLE, WIS., April 11.—The Four Wheel Drive Automobile Co. announces that effective April 4 the price of F. W. D. trucks was reduced from \$4,900 to \$4,200. The cut was made after a thorough survey of existing conditions, meetings with dealers all over the country and conferences with many fleet owners.

## New Line Established Out of Boston

### Overnight Motor Freight Service to Fitchburg and to Towns Between

BOSTON, April 2.—The Zenith Motor lines will put into effect a daily overnight motor freight service between Fitchburg and Boston April 11. The Zenith Motor lines are operated by the Zenith Transportation Corp., M. F. Donovan, president, and B. E. Kingsley, manager of the motor traffic department. The Zenith Motor lines are now operating between Boston, Providence, Fall River and New Bedford, giving a daily overnight service from terminal to terminal at established rates. No pickup or delivery of shipments are made, a freight station being maintained at points to which service extends.

This service has met with strong support from many of the largest shippers in the towns now served, and promises to be a great benefit to Fitchburg shippers as they are assured of an overnight service to and from Boston.

Shippers of Westminster, Gardner, Winchendon, Baldwinville, Templeton, Athol and Orange can benefit by this service by shipping electric express to Fitchburg for transfer to the Zenith lines, and shipments for these points will be accepted at the Boston terminal and transferred to the electric express at Fitchburg.

## Orders 100 Trucks

NEW ORLEANS, LA., April 9.—The Southeastern Express Co., recently organized and which will begin operations on May 1, has placed what is undoubtedly the South's largest order for motor trucks. This company has bought 100 Whites which will be operated in the territory from New Orleans to Washington and from St. Louis and Cincinnati to Jacksonville. Most of these trucks are 2-tonners, mounted with solid panel bodies.

## Gill Opens New Branches

CHICAGO, March 22.—The Gill Mfg. Co., maker of the Gill one-piece piston rings, has opened branch offices in the following cities: Albany, N. Y.; Albuquerque, N. M.; Buffalo, N. Y.; Des Moines, Iowa; Hartford, Conn., and Syracuse, N. Y.

## Fuel Tax Bill in Pennsylvania

HARRISBURG, PA., April 1.—Establishment of a state tax of 1 cent a gallon "on all gasoline sold in this Commonwealth, except for the purpose of resale," to furnish funds for highway purposes, is provided in the administration gasoline tax bill, introduced into the House of Representatives by Chairman Dawson of the Ways and Means Committee.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. C. Building  
239 West 39th Street, New York

## CONTENTS

Vol. XXIV, No. 7

May 1, 1921

### LEADING ARTICLES

Truck Master—Can You Claim the Title?	205
Roundhousing Motor Trucks	207
Can Maggie Casey Ever Understand?	208

### MISCELLANEOUS ARTICLES

The Motor Bus to the Rescue!	210
The Twentieth Century Stage Line	211
"Why Don't You Give Us More Work?"	212
What's Wrong With the Engine?	214
The Trees—Or the Woods?	215
Portable Electric Drill	216
Pity the Blind!	219

### DEPARTMENTS

The Better Way	220
Specially Designed Bodies for Collection of Garbage	223
Luverne Road Graveler Body Has Hopper Bottom	223
Accessibility a Feature of 1-Ton Gramm-Bernstein	224
New 1-Ton Speed Truck Being Built by Kissel	225
Republic "10 Express" a 1-Tonner Mounted With Pneumatics	225
New Accessories and Parts	226
Shop Equipment, Time and Money Saved in Truck Repairs	228
Motor Truck Electric System Wiring Diagrams	230
The Fleet Owners' Forum	231
Editorial: The Right Angle on Truck Road Wear	234

### NEWS

Advocate Terminal for Trucks	235
Action Deferred on Parts Service Plan	235
Illinois to Weed Out Incompetents	236
Fight Michigan Tax on Earnings	236

Index to Advertisers

92-93

## The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT

David Becroft, Directing Editor  
Ray W. Sherman, Executive Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879.

BRANCH OFFICES  
Chicago, Mallery Building, 59 East Madison Street  
Detroit, 317 Fort Street West, Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law	.50c
Canada	\$3.00 per year
Foreign Countries	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

## WYMAN GORDON

*The CRANKSHAFT MAKERS*

WORCESTER, MASS. CHICAGO, ILL. CLEVELAND, OHIO

## The Onward March Continues

IF we had not believed, years ago, that the automotive industry was ultimately to become a vital factor in the economic life of the world, we would not have cast our fortunes in with it.

Nor would we be where we are today if that prophecy had not been fulfilled.

No temporary depression can arrest its progress—there is the irresistible momentum of a world need behind it.



Worcester Division: .. Worcester, Mass.  
Ingalls-Shepherd Division: .. Harvey, Ill.

### DROP FORGINGS

often cheaper than castings

—Always superior

# How Much Do Cheap Creepers Cost You a Year?



How much did you spend for creepers last year? How many are still in good condition? How many will you have to replace this year?

Ask any one of your mechanics how many times they waste half an hour fixing up an old creeper so that they can go under a car on it.

Cheap creepers are pretty costly aren't they?

Continental creepers outlast a dozen ordinary creepers. They cost \$7.50 each and last a lifetime. They're never broken nor out of fix. They start saving time, trouble and money the moment you buy them. Today is none too soon to put them in your shop.

If you are interested in keeping your fleet in the best condition at a reduced cost it will pay you to write today for the complete Continental catalog. It has an answer to every repair and service problem.

## Specifications of the Continental Creeper

Built entirely of steel.

Big and roomy, 20 x 44 inches.

2 inch double wheel casters

A real head rest.

Slats are steel bands.

Conforms to shape of body.



## Continental Auto Parts Co.

2305 E. 17th St., Columbus, Ind.

MANUFACTURERS OF

# CONTINENTAL

*"The Efficiency Standard"*

# SHOP EQUIPMENT



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Vol. XXIV May 1, 1921 No. 7

## TRUCK MASTER — Can You Claim the Title?

*It Calls for*

- 1—Executive Ability
- 2—Good Truck Operation
- 3—Good Truck Maintenance

*There Are Ideas in This Article Which  
May Help You to Become a Truck Master*

THERE are nearly one million motor trucks in the United States—and every day some one is worrying over their performance. Some one is wondering when the two-tonner will be out of the shop, what happened out at Middletown to delay No. 3, whether the light delivery is in shape for a long haul to-morrow, etc. And probably the "Old Man," who heads the business, is always wondering how much longer the fleet will hang together.

True it is that somebody wonders, and back of it all is always—or should be—one man who knows, one man who has been over the trucks many times, who watches them and cares for them, to whom they are more than mere machines and who loves them as he loves his craft of "truck master."

Truck transportation has grown—and is growing. The motor truck business as we know it to-day will be a newer, greater thing to-morrow, and with it will grow the job of the man who "keeps them rolling," who sees to their wants, who cares for them when they are ailing and who stands as a great behind-the-lines force in the modern battle for business.

The work of keeping this machinery in shape and operating efficiently—let us call the job "truck master" for want of a better term—"is," said a man who knows the field, "one of the greatest crafts of the future." He has

---

### Improve Your Maintenance

Depreciation is one of the dangerous shoals in the course of truck transportation. The beacon light is proper maintenance.

It has been stated that a 5-ton truck's depreciation costs approximately \$3 per day.

By adding a year to the life of the truck through adequate maintenance, it is possible to save \$900 for a 300-day working year.

---

### Save Your Money

watched the business for years, has seen it grow, and knows its problems, and as he glimpsed the future he saw what most of us probably would have difficulty visioning.

"Truck master is what the man will be," he said, "and the field is a school

in which some of our best business men of the future will be trained. It presents an opportunity for every man who is linked to-day with truck fleet work. One of the characteristics a truck fleet man of the right sort soon acquires is quick action. He learns to think and act quickly because he has to. Time saved is one of the biggest assets in truck fleet work, and the man who measures up to the real truck master standard has learned that lesson of speed which puts a few men ahead and the lack of which holds millions back.

Truck transportation to-day has few uncharted courses. Past and present experience, the lighthouses, are the guides by which it is possible to avoid foundering on the rocks of ignorance. And as new transportation problems arise and are solved, the "truck master" will find that his course is made just so much safer and shorter.

By knowing the location of these "lighthouses" and "courses," it will be possible for a man to measure up to the standard set in the craft.

There are three main "courses" over which it is possible to speed up truck fleet work. These are so linked up that it is impossible in the craft of "truck master" to avoid the use of any one of them at any time.

# LIVING UP TO "TRUCK MASTER"

The first is the executive and leadership requirement. The second is the successful operation of the trucks. The third is maintenance.

A man may follow successfully any two of the courses and still not measure up to the highest standard of a "truck master." The third course is always necessary in saving time, a prime requisite.

As an executive, he must recognize the importance of system. Without it he is lost. He must be systematized outside the shop as well as inside. When his trucks leave the garage in the morning, in a majority of cases they are not seen again until night. A big investment is left in the hands of each of the drivers. How are they handling this investment? What inroads are they making on the profits through inefficient operation, loading, unloading, etc.? What records are being kept to check up on the time spent between stops, time taken for roadside repairs, etc.? These are only a few of the questions that must be answered under the heading of system.

The trucks must be so routed that there will be no overlapping of territory. A "truck master" would size up his routes, figure the number of stops to be made on each route, and then set a standard of time that would be consumed in covering each. His records should tell him whether his routing system is being carried out or not. Cost keeping is another important item under the heading of system. He should be prepared to answer any questions on the cost of maintenance, operation or fixed charges. Cost accounting is one of the most important "lighthouses" or guides in truck transportation.

As an executive he must be versed in the intricacies of purchasing. He must first know what he wants. He may know what he needs but what he should get to speed up a certain job is usually a problem. Linked up with this problem is what he is going to pay and where he is going to make the purchase. A keen knowledge of the art of purchasing will often save valuable time.

System inside the shop manifestly includes maintenance. The "old man" who heads the business most certainly wants to know what is being spent on his trucks in the way of repairs. And taken from the other point of view, the "truck master" also wants to know or should know whether his mechanics are making the most of their time. Time sheets and other records connected with maintenance should tell the story. A history of every truck from the time it is purchased to the day it is ready to be scrapped or sold should always be on hand. From it, the "truck master" can be guided in his operating as well as in his maintenance system and his truck buying.

## A Leader of Men

He must stand as a leader of men. Under his guidance are men who, though capable of handling their individual jobs with success, must be prompted from time to time with a view to co-ordination. By that is meant the linking up of every duty connected with the truck fleet into

that you know whether he is doing the job right or not. It stands to reason that he will become cognizant of this feeling if there is a possible chance for it without personal contact. Standing off at a distance and directing does not lend itself to real leadership or influence. Furthermore, personal contact without truck transportation "sense" will do more harm than good. Summed up, a man will put into the world what he gets out of it. Inversely, the men under him will be benefited and impressed by the knowledge he gets out of the world.

The second course to be charted is the operation of the trucks. Charting of this course requires the location of many light-houses to guide the way. Knowledge of the transportation field means the correct placing of motor trucks. A man must know when to change from horse to motor truck delivery; how to select the right truck for the work, and how to analyze loading and unloading conditions as a prime factor in saving time. Under the requisites of successful operation

comes a study of laws and road conditions and the selection of pneumatic or solid tires. Laws, road conditions and tire equipment are interrelated and equally important.

Depreciation is one of the dangerous shoals in the course of truck transportation. The beacon light is proper maintenance. It has been stated that a 5-ton truck's depreciation costs approximately \$3 a day. By adding 1 year to the life of the truck through adequate maintenance, it is possible to save \$900 for a 300-day working year. Only by inspection and the discovery of little troubles before they become big

ones is it possible to secure a longer truck life. Inspection is the "all-seeing eye" upon which not only the cost of maintenance and the cost of delivery but the life of the truck itself depends.

The day will come when all of the requirements outlined above will be worked out to the fullest extent. The fulfillment of them is probably what the man meant who coined the term "truck master."



*Good loading facilities mean more than speeding up deliveries. They mean more contented drivers and better service all along the line. These dairy trucks load under cover, so that the drivers are never exposed to inclement weather*

one machine-like movement. That is leadership, yet it lacks the personal influence so necessary. Personal influence with directing power or leadership completes the requirement. With both are attained the full co-operation of the drivers and mechanics and the resultant speeding up of a smooth working organization.

Someone once said that if you want to impress a man, you must be able to do his job better than he can. He must feel



# ROUNDHOUSING MOTOR TRUCKS!

**The Locomotive Runs on Smooth Steel Rails!  
The Motor Truck Operates Over Rough Roads!  
But the Locomotive Is Carefully Inspected  
After Each Trip—Why Not the Truck?**

**A**NY fleet owner who complains about the high cost of keeping motor trucks running can gain a fairer conception of the importance of adequate maintenance by comparing the motor truck with the railroad locomotive.

Picture a large locomotive roundhouse. Tracks lead to it like the rays of the sun. There is much activity inside as, amid the ringing of their bells, some locomotives are coming in and others going out. Gangs of expert machinists are going over each engine. Some are testing bolts, others sounding rivets and still others are adjusting one part or another, until every piece has been tested for wear, looseness or breakage.

The picture is drawn to point out the analogy between the steam locomotive and the motor truck and why roundhouse service for the one is also necessary for the other.

## More Important for Truck

The maintenance garage is to the motor truck what the round house is to the locomotive. The locomotive visits the roundhouse on the strictest kind of orders, after every trip of from 150 to 200 miles. Before it is sent out again it is thoroughly inspected.

If this is necessary for the locomotive, running over smooth steel rails, consider how much more necessary it is that the motor truck be inspected each night, after its day's work is done.

In that its wheels are shod with rubber instead of steel, the motor truck has one apparent advantage over the locomotive. The average locomotive is perhaps twenty times as heavy as the typical 5-ton truck. But in spite of its steel wheels, the locomotive absorbs the light shocks of the rail with comparative ease, while with the motor truck, traveling over rough roads, this is not the case.

With the truck, the impact of ruts, depressions and high spots is transmitted directly to the truck mechanism, with all of its delicate apparatus, including the carburetor and fuel system, the cooling system and the small pipes, wires and sensitive electrical instruments.

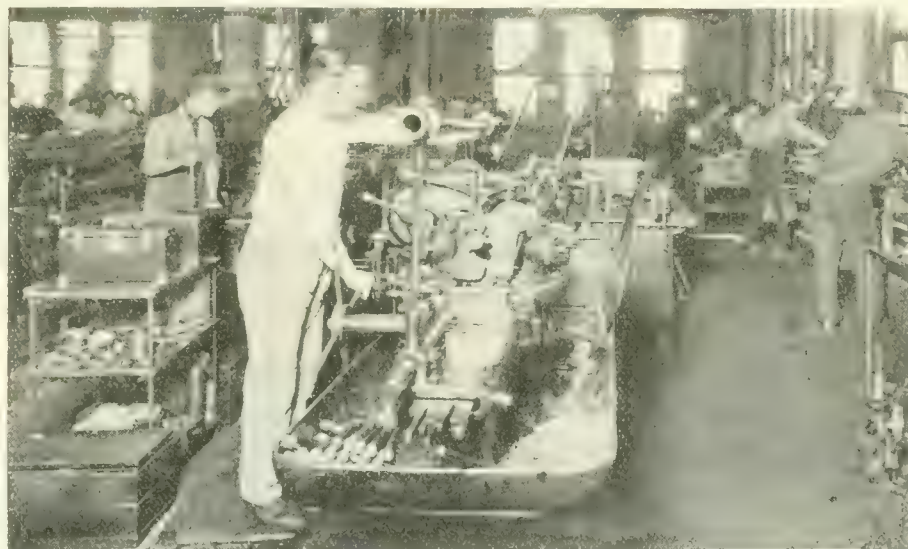
The greater severity of the truck ser-

vice is also shown, when the slow speed of the locomotive engine, with its few hundred revolutions per minute, is compared with the high speed of the truck engine, with a thousand or more revolutions per minute. Under such conditions, surely the motor truck is entitled to adequate roundhouse inspection. And such inspection it must receive, if the life of the truck is to be a long one and the cost of maintenance and deliveries low.

The truck owner must face the problem as it is and install an adequate main-

cure." Inspection catches the little squeaks before they become big rattles.

The driver is the first factor to be considered in any adequate system of inspection. He really lives with the truck and is in closer contact with it than any other man in the truck organization. Therefore, he is in a better position than any other man to know its ailments. He may not be able to remedy or even diagnose the trouble, but he can state the symptoms and let the mechanics do the rest. No successful maintenance system can



*How the American Railway Express Co. roundhouses motor trucks. This is a small part of the big repair department in New York City, where 1000 of the company's trucks are kept in repair*

tenance system. How important it is to lengthen the life of the motor truck is strikingly shown by consideration of only one item of truck operation, namely, depreciation. The charge for depreciation against a 5-ton truck may be approximated at \$3 a day. If, by adequate maintenance, the owner can add one year to the life of his truck, he has saved himself \$900 in real cash for a 300-day working year.

Inspection is the most important factor in adequate maintenance. Only by inspection can little troubles be discovered before they grow into big ones. Daily inspection is "the stitch in time which saves nine." It is the "ounce of prevention which is worth a pound of

be devised which does not utilize the driver's intimate knowledge of his truck. But in order to utilize this knowledge, care should be taken, in laying out the driver's daily report card, to make the questions simple and non-technical, so that any driver will know what is meant.

A chart of symptoms of truck ailments is of the greatest value in this work. For the truck mechanic can determine the condition of the vehicle from certain knocks, sounds or squeaks noticeable when the truck is running. Then, if the driver describes these sounds on his report card, the mechanics' work of diagnosis is that much simplified and expedited.



# Can Maggie Casey Ever Understand?

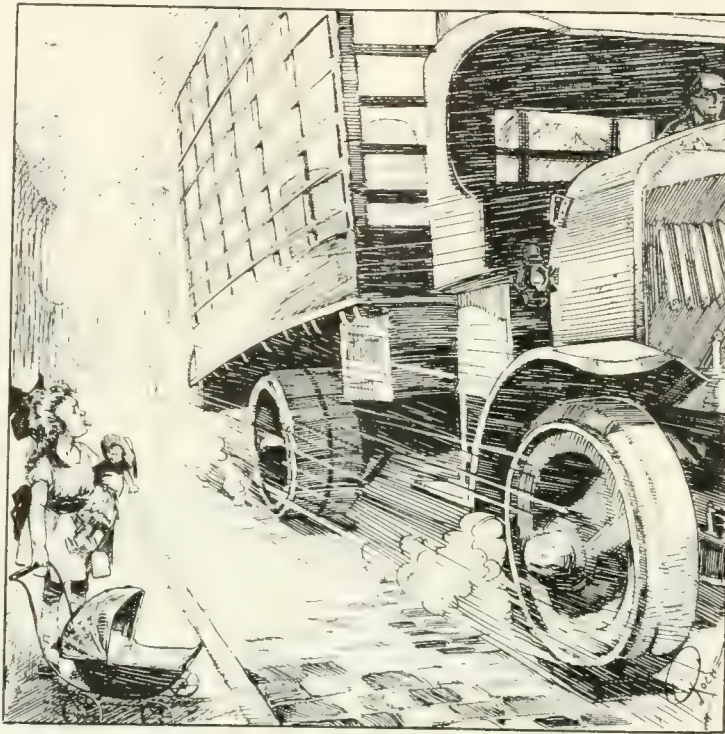
## Trucks Are Increasing Public Prosperity! But What Is the Public Doing for Trucks?

AS the big, shining motor truck lumbered past, little Maggie Casey stood at the curb-edge on tiptoe and stuck out her tongue at it.

Then she picked up her doll and pointed out the truck. "Look at the blame thing, Mary 'Liz' beth," she cried. "Ma says 'taint safe for you an' me to play in the street any more, with them things clutterin' up. An' Pa says they're takin' the bread out of our mouths. Says he'd be gettin' more money for drivin' his big locomotive, if 'twasn't for them things."

The doll did not appear particularly interested, so Maggie reversed Mary Elizabeth and spanked her half-heartedly.

"And," she added, "Pa says they ain't no good, anyhow!"



MAGGIE CASEY'S views on the motor truck may not appear particularly important. But the trouble is that there are many millions of Maggie Caseys, including legislators, in these United States!

It is a lamentable fact that in the eyes of a vast number of citizens—those who look at the thing at all—the motor truck is regarded as a destroyer of wealth.

Now here is the other side of the picture.

Little Bella Cassidy stands at her front gate, in the San Joaquin Valley, California, one of the most fertile tracts of land in the world since it was irrigated.

A big truck lumbers past and Bella stands on the lowest bar of the front gate of her father's farm and sends up a treble cheer, waving a dissipated looking doll by one arm.

"There he goes, Sally Jane! That's Dan Tucker. He's on the way to market. Pa says the lean days is over now, since Tucker began trucking for us."

She gives the doll a shake to command attention. Just think, Sally, it's a 30 mile run—and before Tucker came, Pa couldn't get anybody to haul his things to market. So you an' me pretty nigh

starved. Now Pa says he could sell the farm for thirty million dollars any day—or maybe he said thirty thousand."

### Agitation Misleading

In the case of Bella Cassidy's father, motor trucks created wealth—not destroyed it.

There has been a great deal of agitation of late over the fact that motor trucks are depreciating and destroying our highways. To a certain extent, under the present system of highways, this is justified. But the agitation has resulted in a false view of motor trucks on the part of the general public and the legislators—and this point of view is short-sighted and likely to prove very costly to future industrial progress.

The only way to bring the true facts home to the public is to educate them to a proper appreciation of what the motor truck is doing and will do for civilization and industrial progress. And if an association of members of the industry can do this, such an association will have done great work.

It is something of this kind that the National Association of Commercial Haulers is preparing to carry into effect. And the following are some of the points on which C. R. Collins, General Manager

of this Association, plans to base his campaign.

### Transportation Is Civilization

Since the dawn of civilization, transportation has been the third salient factor in its evolution. For the products of mother earth were the first and labor the second.

But the time has now come when transportation is the most important element in the onward march of industry and hence of civilization.

There are three types of transportation of commodities—water, rail and highway. And economic thinkers are fast coming to the realization that highway transportation is not the least important of the three.

But highway transport is of comparatively recent growth. It has come into conflict with the older

types of transportation—and it has been handicapped by highways not originally designed for the burden highway transportation has now laid upon them.

Hence the mistaken viewpoint. *But this viewpoint should be combatted with every means available. And the best means available is a sincere, united and sustained effort on the part of the automotive industry to educate the public to a juster view of the motor truck.*

### Trucks Reduce Prices

Maggie Casey's father told her that trucks were taking the bread out of her mouth; because he believed that trucks were hurting the railroads and so reducing his salary as a railroad employee.

Maggie's father may not know it, but his employer knows that the railroads, through their very nature, are not sufficiently flexible to handle all the future freight involved in the industrial growth of the nation, on a paying basis.

But what happens when transportation falls down? Prices go up. Unless there is a flexible and sufficient distribution of a commodity, there is a scarcity of that commodity. And where there is a scarcity, there is always a rise in value and a corresponding rise in prices.



But trucks insure distribution of commodities to-day, where the railroads cannot do so. Therefore, trucks have reduced prices.

If it were not for trucks, Maggie Casey's father might receive a larger salary. But he would probably have to pay a lot more for the bread that goes into Maggie's mouth, to say nothing of the clothes she wears, etc.

### Trucks Increase Production

Trucks carry commodities into communities which the railroads do not and cannot reach on a paying basis. But in addition, they distribute the goods which the railroads do carry. For the railroads cannot deliver at the door of the consumer or the retailer. Therefore, the cost of railway transportation, plus the cost of truck transportation at both ends, has to be added onto the price of the commodity. Where the truck alone carries the goods, there is one transportation charge instead of three to come out of the consumer's pocket. Although the truck transportation charge is higher than the railroad freight charge, this is counter-balanced by far more prompt delivery. For prompt delivery means satisfactory service and more business. And the average American wants what he wants when he wants it.

But trucks do more than reduce prices. They increase production. And increased production makes for prosperity all along the line.

This is the reason. Trucks carry goods into markets hitherto untouched by old methods of transportation. At one time, almost everything of household use was made at home. Clothes were woven, furniture was built, all sorts of foods were preserved in the home. And in those days, people of necessity got along with as few of these things as possible, because of the labor they involved. But as manufacturing and transportation facilities increased, goods were more cheaply manufactured and more readily obtainable. So the consumption of these goods went up. And as the consumption went up, the demand went up. Therefore, transportation not only fills the demand for commodities—it increases the demand.

Increased demand, with increased transportation facilities, means increased production. And increased production means increased prosperity. Increased supply follows and prices go down all along the line.

### Trucks Increase Values

Trucks are doing these things for the country today. But as trucks open up new markets, they increase the prosperity and wealth of the country in another way,

which is having, and will have a tremendous influence on its future.

As trucks penetrate into territories hitherto untouched by the old methods of transportation, new sources of raw material are rendered available to future industry. And as these fields are opened, land values in these districts go up and the taxes on those lands are increased in proportion. So the governmental revenues go up, the county, state and national wealth is increased, there is that much less need of county, state and national revenue from other sources, taxes are decreased in other directions and prices go down accordingly.

The San Joaquin Valley, already mentioned, is an interesting example of this process. When irrigation first began in the district, the railroad ran through the town of Modesta, which is centrally located in the Valley. When irrigation began, land within five miles of Modesta went up in value to somewhere around \$1,000 an acre, because horses could haul to the railroads products of the land within that radius.

But as distance increased, land values decreased, although the land was just as fertile, because goods could not be transported to the railroads on a paying basis and the railroad could not come and get the goods for distribution. Until, at the 30 mile radius, land was worth about \$50 an acre and was assessed, for purposes of taxation, at about \$25 an acre.

Then the industrial truck made its appearance in the San Joaquin Valley. Almost at once the land beyond the 5 mile radius began to go up in value. And as the number of trucks increased, the value of the land increased, until now land within 30 miles of Modesta is worth about \$1,000 an acre and is assessed at about \$500 an acre.



R. C. Collins, general manager of the National Association of Commercial Haulers, believes in and is working for a square deal all round, for the truck owner, the public and the state

That land, then, is paying twenty times as much taxes to the government as it paid before trucks came into the territory, to say nothing of excess profits taxes.

### The Public Benefits

That is a little of what the motor truck is doing for the public today. But what is the public, through its legislative representatives, doing for the motor truck?

It is taxing it up to the hilt and beyond. And it is threatening to tax it out of existence. Perhaps the public are merely indifferent, but the result is as bad.

The legislative point of view on the truck is a curious one anyway. Trucks use the roads and damage the roads. Then let the trucks pay for the roads.

This argument is fair enough for the most part, although the damage caused to highways by motor trucks is very grossly exaggerated in many instances.

But the trucks themselves cannot pay. Somebody has to pay. So the legislators have fixed on the owners of the trucks to pay.

If trucks use the roads and damage the roads, the people who use the trucks should pay for the upkeep of the roads and for the construction of new roads. There can be no question about that. But who does use the trucks?

### Who Uses the Trucks?

Suppose John Smith has a farm and he wants to ship his produce to Tom Jones, who markets it. He hires Jim Brown's trucks to haul that produce.

But without the means of transporting the produce from the farmer to the market, both John Smith and Tom Jones would have to go out of business. Therefore it would seem that John Smith and Tom Jones are the people who use the trucks. And Jim Brown is merely an agent!

But it is poor Jim Brown who is called upon, through ever increasing license fees, to pay for the upkeep of the roads used by John Smith and Tom Jones and to pay for new roads to be used by other Smiths and Joneses.

And if Jim Brown, who is merely the agent employed by the other two to keep their businesses going, tries to get back this money which he is called upon to pay out for the roads by increasing his haulage charges, there is a tremendous commotion over the high cost of transportation.

Now the truck owners of the country are willing to pay their fair share not only of the cost of maintaining the roads but of the cost of building new roads, because new and better roads mean more and better business for the haulers. But the truck owners want a square deal.



# The Motor Bus to the Rescue!

## *When Middletown Needed a Rapid Transit System and Could Not Afford Street Cars, Buses Filled the Need*

**A**BOUT 5 years ago the growing city of Middletown, Ohio (it increased 76 per cent in 10 years and has a present population of 26,000), awoke to the fact that some sort of a rapid transit system had become a necessity. For years the only thing in the way of a street railway it could boast was a mule car that operated between the two railway stations of the town. This line amused visitors to the city but was anything but a joke to the home folks and was useless as a means of solving the transportation problem.

### Motor Bus or Trolley?

The Chamber of Commerce, realizing that action had become imperative, determined to get a rapid transit system in operation at the earliest possible moment. C. E. Palmer, a former Middletown man, who had studied the transportation problem for years and had had much practical experience, urged the use of motor buses, declaring this was the coming method of passenger service for cities. The Chamber, however could not see his point of view and had set its heart on a trolley line.

Investigation revealed an old ordinance that permitted the city to lay tracks in the streets and lease them to an operating company. A committee was appointed to investigate the cost of

laying the tracks and making the necessary improvements in the streets and to get in touch with men who would finance an operating company. Its report put an end to the Chamber's dream of an electric car system. It was found the city would have to expend nearly a half million dollars in doing its part. The company would have to expend nearly as much in building a power-plant and providing necessary equipment and it was so self-evident that such an investment would not pay there was nothing to do but drop the plan altogether.

It was then that Mr. Palmer came to the rescue. He incorporated the Middletown Transportation Co. to operate a line of motor buses through the streets of the town. He bought two second-hand trucks, had them remodeled for his bodies and put them into service over regular routes. The venture proved a success from the start. As business increased more buses were added and the service improved. Special routes to the factories to accommodate the workers were established and extra buses made trips to and from the plants both morning and evening. A 5-cent fare, with six tickets for a quarter gave a satisfactory service to the city and also a satisfactory return on the investment, which, in comparison to what an electric railway system would have cost was almost negligible. In those days the company could buy gasoline at 8 to 8½

cents a gallon, oil for 30 cents and labor was not asking \$1 an hour. So the line prospered and Middletown got rapid transit without the town expending a cent.

### Unfair Competition

The success of the venture, however, aroused the Green-Eyed Monster and it was not long before competition began to appear. A man with a small, second-hand car seeing the opportunity to make money would slip in ahead of the buses and pick up fares which he could carry more quickly than the slower-going buses. This competition grew and before long another competing line was established. Later two more lines appeared, taking new routes, one in opposition to the Cincinnati & Dayton Traction Line.

Right here is the one and only serious drawback to the successful operation of motor buses as street cars in the smaller cities. The Middletown Transportation Co. had demonstrated that a line giving good service to the community could be maintained and yield a satisfactory return to the company. But when a half dozen competing lines break into the business it is ruined for all of them. The question of protecting the original Middletown company was taken up with the city solicitor and it was found there was no law that could be used to protect it. The company then took the matter up with the state's attorney and careful investigation failed to find any help from laws governing state utilities. Street railways which had tracks laid in city streets, were given ample protection but outside of the \$10 license for each truck in operation, there was nothing that could be applied to a city motor bus line.

Mr. Palmer says:

"If the smaller cities are to have a cheap and efficient passenger service there must be some law to protect the men who put their money into motor bus lines. These men can give a community better and cheaper passenger service than electric lines, but if every man with a second-hand car is allowed to enter the field and the men who have gone to the expense and trouble of providing an efficient public service have to be at the mercy of unlimited competition, the inevitable result will be the failure of all of them."

The Middletown Transportation Co. is now operating nine buses, using the



*One of the buses that supplied a long felt want in Middletown, Ohio, providing the town with the needed rapid transit system, when it was found that a street car line could not be built except at a ruinous cost to the town*



Armleder 1 and 2-ton trucks. The route covers a distance of 12 miles. During the rush hours, buses are run every 7 min. and during the remainder of the day on a ½ hour schedule. As mentioned above, special routes serve the factories at starting and quitting time. About three thousand people a day are served by this line alone. Cars maintain an average speed of 18 miles an hour, which is better time than the average speed of a city trolley. In Cincinnati the street car's average time is 10 miles an hour. Buses make stops at the houses instead of at street corners, which is a great convenience for the passengers, but would consume too much time in larger cities.

The 5-cent fare with six tickets for a quarter has been maintained since the lines were first started. Just now the Middletown company is selling ten tickets for a quarter in order to fight competing lines. This is only temporary, however, for such a rate would not pay for the cost of operation, let alone pay interest on the investment, and as soon as the war is over the old rate will be re-established.

The company has invested only about \$30,000 in its plant. This compared to the amount of money that would have had to be invested to install an electric trolley system gives a very good idea of how much safer a motor bus service is for small city rapid transit as an investment.

The cost of operation now is considerably higher than it was when the company first started. Mr. Palmer figures it costs his company between 20 and 30 cents a bus-mile under present conditions.

**Young Drivers Best**

Drivers are paid 35 cents an hour. These are all young men. Mr. Palmer

declares that he has found them more dependable than older men, which is a reversal of his original judgment, but he says experience proved such was the case. If young men interested in trucks can be secured and taught to take pride in the care of their machines, one of the



**Service on Parts!**

*It is your right—  
To demand the following:*

- 1—Quality, trade-marked truck spare parts.
- 2—Prompt and unfailing merchandising and delivery of parts.
- 3—Reasonable prices on parts, which shall be uniform to all.
- 4—Parts price lists on file in the owner's office and in the office where he buys parts.

**It Will Mean Better Business All Round**



important problems has been solved, according to Mr. Palmer.

A repair department in the garage employs two men in the day time and one at night to keep the trucks in running order. These men receive the same pay as the drivers. It will be noted that pay in the small towns is not what labor unions in the larger cities demand and this is a big item in reducing the cost of operation in the smaller cities.

The wear and tear on equipment is one of the big problems confronting operators of motor bus lines, but in a city such as Middletown, where the streets are kept in good repair and there are no grades, a reasonable amount of care will prolong the life of a car almost indefinitely providing it is well built in the first place.

In the years it has been operating the Middletown company has had just one accident and that was during its first year.

**The Bus Advantages**

Here then is a summary of the advantages gained by Middletown's experiences of the motor bus as a solution of he small city's rapid transit problem:

An electric railway system means the expenditure of hundreds of thousands of dollars to install. It requires a powerhouse, overhead wires and crews to care for both. A motor bus service requires no such expenditure.

A street railway would have to pay the city for a lease. A motor bus line pays only the yearly license fee for each truck.

An electric street car costs considerably over \$10,000. A motor bus costs not over \$5,000.

An electric street car system is tied up when a car breaks down or is put out of commission, and traffic is blocked. No interruption to traffic is caused when a motor bus is out of commission. Another bus can be put into immediate service and the disabled bus pushed to one side where it will not interfere with traffic.

The cost of operation and money invested makes a 5-cent fare on an electric street railway in a small city impossible.

A motor bus service can be operated with a 5-cent fare successfully if protection can be secured for the investor and can give more satisfactory service, for it can easily change its route to meet new conditions without the expense of relaying tracks.

**The Twentieth Century Stage Line**

A RURAL bus line known as The White Line Stage Co., was recently formed to operate a line of buses over a regular route in the El Dorado oil fields.

The bus bodies are built to accommodate fifteen passengers in addition to the driver and are equipped with plate glass, drop sash windows held in place by anti-rattlers. Entrance is made through a door at the front of the bus opposite the driver's seat. The body is made of metal mounted over felt to prevent rattling.

The body was manufactured in the plant of the Hebb Motors Co., Lincoln, Neb., maker of the Patriot truck, on which the body is mounted. It is built to fit a 1-ton chassis for fifteen passengers and a 2-ton chassis with a capacity of nineteen passengers in addition to the driver.

The list price of the fifteen-passenger bus body is \$600, not including the trunk rack and baggage rail. The price of the larger body is \$700, excluding the trunk rack and baggage rail.



*This bus carries passengers and mail from Potwin, Kan., to Ferris City, Oil Valley, Elbing, White Eagle Station and Burns. It has a baggage rail on top, a trunk rack at the rear and a door at the rear in case of accident*

# "Why Don't You Give Us More Work?"

*The Driver Said to the Boss—It Sounds Funny But It's True—And He Meant It—And the Reason Why Is Interesting*

**F**LEET management—real, intensive management—is an art. And like other arts, it is complex and elusive in many ways.

But the most important element of it—the warp and woof of it—is the personal factor.

The man who holds the reins of authority must have complete trust and confidence in the men under him.

The men themselves—the drivers, mechanics, foremen, superintendents and others—must have complete trust and confidence in the authority who stands as the final court of appeal.

That is the most important factor in fleet management.

## Getting the Right Man

The Eleto Co. operates 166 trucks with which it handles all deliveries for Lord & Taylor and James A. McCreery & Co., two of the largest department stores in New York City. And it is not at all uncommon for one of the drivers to ask Robert H. Forbes, president of the company, why he does not take on the deliveries for a third big store! The driver asking for more work! It sounds funny—but it's true—and he means it—and the reason why is interesting. The drivers are a part of the organization and have the company's interest at heart. And it's all because of the way the company treats its employees.

The company has been using this big fleet for about two years. So that the building up of so large an organization has been comparatively recent.

At the beginning, trucks had to be purchased and drivers had to be hired to drive the trucks. The purchase of the trucks was comparatively simple, because their possibilities of performance could be pretty definitely gaged from previous experience.

But the hiring of the drivers was not so simple, because the human element is always an unknown quantity and previous experience is but little guide.

This leads to the first of two features which are essential to the establishment of the kind of mutual confidence and esteem between drivers and manager, essential to the best kind of fleet man-

agement. The drivers must be the right men!

In the beginning the turnover of drivers at the Eleto Co. was very high indeed.

A high turnover is bad because it means wasted time in training men—but unsatisfactory drivers will do more damage and cost more to the company than even a high turnover. Therefore, the turnover was high as first, because the drivers were sifted again and again for the right men—and the wrong men were weeded out.

Mr. Forbes, president of the Eleto Co., does not believe in keeping an unsatisfactory driver for the sake of keeping down the turnover—that is the gist of the matter—and the result has been that turnover is now almost entirely eliminated, so far as the drivers are concerned.

Now the company has the men it wants—and the men have the jobs they want—and the result is a happy, contented family, of which the keynote is mutual confidence.

## Keeping the Right Men

Drivers have been particularly mentioned above, as the hiring of drivers is so important an element of fleet management. But the same rules apply to other fleet employees. The right superintendents, foremen, mechanics, etc., are equally important to the mutual confidence essential to a successfully operated fleet.

But when the right men have been acquired, the management of the fleet must be such that these men can be retained indefinitely. And this leads up to the second prime essential in the establishment of mutual confidence.

The men must have complete trust and confidence in the authority that is their guiding principal and their court of final appeal.

This trust and confidence is not easily attained!

The fleet manager must guide rather than direct. He must be a philosopher. And he must be a friend to the men.

It is this triple position to which Mr. Forbes has attempted to attain ever since he first took over the managing of the big Eleto fleet.

In the first place he has seen to it that the drivers work under conditions

as pleasant and favorable as the nature of the work will permit. In the second place, they have trucks of which they can be proud. And in the third place, their pay compares favorably with that of other drivers in similar lines of work.

Then, too, Mr. Forbes has worked out a careful ideal of administration. One of his rules is consideration of his men. If anything goes wrong, he does not believe in bursting out forthwith and blowing a man up. In the first place, this means that the man will be disgruntled and sore, whether he has been negligent or not. And in the second place, it is taking the matter out of the hands of the man's immediate superior. And Mr. Forbes believes that this lessens the man's respect for his immediate superior, and he worries only about what the boss will think.

## Always Ready to Listen

But this applies only in the matter of discipline. For Mr. Forbes has shown his men, through a long course of consistent treatment, that he is always ready and willing to listen with sincere interest to anything they may have to say. Nor do the drivers take advantage of this attitude to run to Mr. Forbes with trivialities. On the contrary, they value his friendship, and hence value his respect and esteem for their intelligence, sincerity and good will.

For example, Mr. Forbes never lets a man feel that he is laying up trouble for himself by asking for things. A man recently came to the president and asked for a raise. The president asked him whether he wanted the raise for some specific reason, such as getting married, or whether he thought himself underpaid.

The man said: "No, sir, but I just happened to hear that so-and-so got a \$3 raise and I thought I'd like one too." "Well, I'll tell you what I'll do, if you like," the president answered. "I'll fix it so that you get as much as he does now. Do you want me to?"

"That'll be fine," the driver answered.

"Well, it's all in the way you look at it. For you'll be getting less than you are getting now!" was the president's reply.

The driver was a little crestfallen at first, until he realized that Mr. Forbes did not intend to reduce him. Then they



both laughed over the driver's mistake. And Mr. Forbes took particular pains to single the man out a day or two later and congratulate him on his work, so that he would not think he had hurt his own cause by asking for a raise. This is the attitude that makes for contented men.

The ideal of personal responsibility is also fostered at the Eleto Co. A man is willingly given as much responsibility as he can and will take. He is given all the assistance and consideration possible, and he is encouraged rather than discouraged by criticism when he falls down.

The company is considerate of its men in other ways also. For example, it has installed a system of group life insurance by which the men in its employ are given life insurance *free of charge*.

The employees are automatically insured within a very short time of joining the company. There is no physical examination for this insurance, so that all the men share its benefits.

But the company has arranged matters so that if a man leaves the company he can still keep up his insurance by transferring the policy and paying the premiums himself. Thus the insurance does not act as a club over their heads to influence them to stay with the company.

In the first place, no such club is necessary. And in the second place, the men fully appreciate the consideration of such an attitude on the part of the company.

### Results of the Policy

Experience has shown Mr. Forbes, also, that dishonesty on the part of a driver is usually either the result of a vindictive, revengeful spirit against some individual higher up in the company, or else of too low a salary.

This is borne out by present experience. For the men are well paid and well treated, and there has been no single case of dishonesty within the last year, which is a pretty good record.

The men are respected and trusted. Therefore, they live up to that respect and trust. But because they do live up to the company's opinion of them and are honest and reliable, they can be still further trusted, and this fact has been a very important item in the successful, economical operation of the trucks.

For example, in retail store deliveries, it is not uncommon for drivers to turn in a large number of packages off the last route of the day, the idea being that they have been unable to make deliveries. The real reason is, however, that the driver wants to get back to the garage and knock off early, so he does not want to complete his route. Then it is easy to say that he could not make delivery.

But the Eleto company drivers consistently get out of the garage early, so that they are well ahead on their routes and the returns are few, on the last delivery.

Moreover, the two trip drivers are given an excellent lunch free.

Here is another way in which the ability to trust the drivers works to the advantage of the company. The packages, with the exception of the C.O.D.'s, are not sheeted, as they are in most retail store delivery systems. Each driver merely signs for a certain number of packages.

But under this system, if a driver finds that one package is at the extreme end of his route and means a long run, he will turn it over to another driver, whose route adjoins his own and who will be nearer the address. This system means a lot of running time saved for the first

This policy was an experiment. The two big stores distrusted it a little at first, but it has worked out well and is now an established precedent.

### Customers Appreciate Service

Mr. Forbes tells an amusing example of the kind of service his drivers give to the customers of the two big stores and how it is appreciated. A customer recently made a purchase at one of the big stores just before it closed. She lived in Greenwich, which is about 30 miles from New York.

The package went out that night on



*Robert H. Forbes, president of the Eleto Co., at the desk in his office where his men can always find him "ready to listen"*

driver's truck. But it would cause a lot of confusion if the packages were sheeted.

There are countless evidences of this keenness and loyalty on the part of the drivers. For example, one driver on a suburban route walked over a mile during the last heavy snow storm to deliver two packages, because his truck could not get through. He did not mention the fact, but the customer was so much struck by his action that she wrote in and congratulated the company!

In suburban districts, the drivers get out as early as possible. But they are wise enough and experienced enough to pick out the type of customer that will be disturbed by an early call, and they make deliveries to such customers on the way back.

The men themselves like these early deliveries because they mean less traffic and that the work is cleaned up sooner. The customers also like it, because they are in in the early morning.

a night transfer truck to the suburban depot handling deliveries to Greenwich. It was picked up the first thing in the morning and delivered to the customer at 8:10.

The customer opened the door herself and refused to believe that it was her package. She made the driver wait while she opened the package, and when she found that it was the article she had bought late the night before, she sat down and wrote to the company congratulating them on their performance.

Customers appreciate such a service. And their appreciation is a big asset! But it would be impossible to give such a service without the loyalty, keenness and reliability of the drivers.

It is this loyalty, keenness and reliability which Mr. Forbes has tried to foster—and has succeeded in fostering—among his employees. And he has done it by the kind of considerate treatment that establishes mutual trust and confidence.



# What's Wrong With the Engine?

## Let Your Drivers Carry These Hints on Engine Troubles. They Will Save Time!

**T**HERE are so many troubles that may cause a gasoline engine to slacken or fail that few drivers can remember and look for them all when something goes wrong with the engine.

Moreover, when a driver is in a hurry, even the best man will become confused and impatient sometimes when his engine fails, and overlook some quite simple and easily remedied trouble if he has only his memory and imperfect mechanical knowledge to rely upon.

It is, therefore, suggested that the following facts be made up into a chart, copies of which should be handed to each driver in the fleet. The driver should then be instructed to carry his chart in a convenient place where he can refer to it quickly, if anything goes wrong with his engine.

### Loss of Power

Loss of power may be caused by the following *ignition* troubles: Spark occurring too late; spark weak because of partial short circuit or battery becoming exhausted; dirty spark plugs; poor connections; dirty timer; poor or broken wiring in case of magneto; breaker points worn, oily or out of adjustment; commutator brush dirty or oily.

Loss of power is caused by the following *fuel* trouble: Mixture too lean or too rich; supply pipe partly clogged; inlet valve not opening sufficiently, due to wear; water in fuel; leaks around inlet manifold.

Loss of power is caused by the following *engine* troubles: Overheating in cylinder bearings; gummy, inferior or insufficient oil; exhaust pipe partly clogged; governor out of adjustment; lack of compression, which may be due to worn, stuck or broken piston rings; scored cylinder walls; leaks through and around head joints; valves sticking, worn, pitted or not seating properly because of dirt; in cold weather, engine and cooling water too cold.

### Exhaust Explosions and Misfire

Explosions in the exhaust are caused by the following: Irregular ignition; poor spark or very late spark; mixture too lean or too rich.

Misfiring is caused by the following ignition troubles: Weak batteries; poor connections; dirty timer; vibrator or breaker points pitted, dirty or poorly adjusted; dirty or cracked plugs or points of plugs not properly spaced; make and break points not touching properly.

Misfiring is caused by the following fuel and engine troubles: Mixture too

lean or too rich; fuel passage partly clogged; water in fuel; lack of compression; valves sticky or not working properly.

### Pounding and Backfiring

Pounding is caused by the following: Spark too early; red-hot carbon deposit in cylinder; loose bearings; tight piston due to lack of oil or lack of cooling water; hot bearings; loose flywheel; very loose piston (piston slap).

Backfiring is caused by the following: Spark too late (if engine backfires and stops, spark may be too far advanced); short circuit on primary wire; wired to wrong plugs; weak mixture; occasionally, too rich mixture; leaky or stuck intake valve; red-hot carbon deposits;

leaky manifold or carbureter gasket.

Overheating is caused by: the spark being too late or very weak; by too rich a mixture; by insufficient lubrication; insufficient cooling water; circulation of cooling water impeded; pump not working properly; heavy carbon deposits in cylinder; water chamber coated from impure water; loose fan belt.

Irregular speed is caused by: Loose connections or partly broken wire; vibration or breaker points pitted; gasoline supply irregular; dirt on needle valve; governor gummy, sticky or badly worn or out of adjustment; valves sticky.

These engine-trouble hints are reproduced here through the courtesy of the Sterling Motor Truck Co., Milwaukee, Wis.

## A Look Into the Marshall Field Delivery System

By E. E. PIERSON

**D**RIVERS of electric and gasoline delivery cars for Marshall Field & Co., Chicago, are expected to call attention to necessary oiling or greasing of their cars, or anything else calculated to lessen trouble and promote efficiency.

A rule of the company requires every driver to be in his seat and ready to leave the garage at 7.30 a. m. every day in the year excepting Sundays and holidays.

By 7.45 a. m. all wholesale delivery cars leave the garage and, by 8 o'clock, the last of the retail delivery cars have gone.

The cars with the longest mileage to cover depart first, while those with lesser leave last. This system is always maintained in order to plan the arrival periods at the various destinations as nearly uniform as possible.

Drivers are held responsible for the appearance and general care of the car they drive. They must keep all nickel and brass parts polished.

The firm gives each driver two uniforms per annum where employed in the retail delivery service. One suit of lighter weight is for summer wear, and the other of heavier material for winter.

Each driver is also furnished with a uniform overcoat and this garment ordinarily lasts two years. The firm maintains all necessary repairs and cleansing. Some drivers will be able to wear an overcoat three years and a suit two

years. There is a variation in this as in every other department.

The firm maintains its own outfitting department and, buying cloth in large quantities, is able to keep down the expense of uniforms to the minimum. The cost of each uniform is withheld by the firm.

Drivers of wholesale delivery trucks, handling rough and soiled boxes, are not uniformed. They wear overalls of their own purchase. The firm finds it imperative to uniform the retail drivers and takes pride in the natty appearance of all such employees. Neatness is insisted upon.

Clothing must be well brushed and shoes must be shined. Slovenly appearance while on duty is never tolerated. Any violation of this rule is given quick action.

The firm does not figure that the policy of supplying uniforms free reduces the cost of truck operation or repair. The sole object is to maintain the high reputation of the company for efficiency and order.

The same rule holds good in each department of the retail and wholesale stores. It is but natural that it should be extended to the delivery system. Untidy, impolite, or inefficient drivers would injure the reputation of the firm, a reputation that has been built up by long years of painstaking endeavor by the founder and the administrative corps.



# The Trees— Or the Woods?

*Old Hammerhead  
Talks About Details*

By Sinclair Gluck

OLD Silas Gunther was very busy. Some of his friends sometimes wondered why the old man did not retire and let somebody else take over the responsibility for the biggest commercial house in town. But when they questioned him on the subject the old man told them that his harness fitted him so snugly that he would feel lost without it—"and besides, what is the good of living if you can't work?"

This morning he was buried in a mass of work—pretty important work—but when there came a knock at the door and the machine shop foreman stuck his head in. Old Gunther smiled and nodded. "Come in, Peterson. Come in. Sit down."

The big foreman sidled into the room with a somewhat sheepish look on his face and slid into a chair. All his men had a wholesome respect for Silas Gunther, or Old Hammerhead, as they called him. The old man had a faculty of hitting the nail on the head and getting to the root of things that was a bit disconcerting sometimes.

But this morning indignation was simmering in the big foreman.

And presently it boiled up and overflowed his natural awe of his chief.

"Well, Peterson?"

"Mr. Gunther, sir, I—I can't go on like this!" the big fellow broke out.

## Sizing Up Your Job

Old Hammerhead's eyebrows went up and for a moment his eyes held a steely look. Then suddenly he smiled.

"Can't, eh? Why, what's the trouble, Peterson?"

"Well, sir, Mr. Ross is always complaining. This is the third time in a week that he's jumped on my neck because some repair wasn't just right."

Old Hammerhead leaned back in his chair. "Well, was it right, Peterson?"

"No, sir. The work was a bit faulty. But I didn't do it and—"

"But you're directly in charge of that work, aren't you, Peterson?" the old man struck in.

"Yes, sir, I am. But how the— How can I supervise all the work of all my mechanics, when I've got so much to do myself. Mr. Ross keeps piling work on to me. This repair has got to be done right away and that repair has got to be

done by tonight because the truck has to go out on a long run—and if they aren't done on time, there's the

deuce to pay. So I have to turn to and do a lot of it myself. And then he wants to know why I don't supervise all the other work too."

Old Hammerhead nodded and turned kindly, genial eyes on his foreman. But he did not answer immediately and after a moment the foreman leaned back in his chair, his expression of indignation relaxing a little.

Then presently the old man spoke. "I see your difficulty, Peterson. But it seems to me that perhaps you haven't sized your job up just right."

"How's that, sir?"

"Well, I'll tell you. Your work is directly connected with getting the repairs done and getting them done right. But you're not a mechanic first. You're a foreman first and a mechanic afterwards. Do you see what I mean?"

The foreman looked puzzled.

"It's like this," the old man went on. "You were made foreman so that you could be responsible, not for your own work only, but for the work of other men under you. That's your main job, Peterson."

The foreman began to simmer again. "But how can I, sir, when he keeps piling more work on me than my men can handle?"

## "But That's Your Job!"

Old Hammerhead shook his head, smiling. "But that's your job, Peterson. You're there to see that your mechanics *don't* have more than they can handle! You're there to supervise, Peterson. And arranging to have others do the work and do it well is part of that supervision."

"But I haven't got enough men, sir."

"Well, whose fault is that, Peterson? Have you asked for another mechanic and been refused?"

"No, sir, but we don't really need another mechanic, because I can do whatever work is over—"

Old Hammerhead laughed. "But you



do need another mechanic, Peterson. Unless you have enough men to do all the work, you have to do some yourself. And if you have to do repairs yourself, you can't watch what the others are doing. You can't supervise. But that's what you're there for. So you do need another mechanic."

"Well, why doesn't Ross give me one?"

"Because you never asked for one, Peterson. That was a part of your job that you neglected. And like any neglect, it got you into difficulties."

"Look here," the old man went on, "Did you ever hear of the man who went out to have a look at the beautiful forest he had heard about. He walked and walked and presently he came to a lot of trees. He walked in among the trees, went in deeper and deeper, to where the trees were very thick. But by that time he couldn't see more than a few yards around him. So he got disgusted and indignant and went home."

## "There Were Too Many Trees"

"In other words, Peterson, he couldn't see the woods because there were too many trees that got in the way."

"Do you see what I mean? That's what's been your difficulty. You got so close to the details of your job that you couldn't get a comprehensive view of it. So you got disgusted."

"What you've got to do is to get away from the trees—get right away from the details of your job—and get a good look at the woods from a little distance—look your job over in a comprehensive way."

"You see, Peterson, details obscure the vision. And you're in the position of an executive—and an executive is a man who is supposed to have vision. So you see, it isn't Ross's fault. It's yours, Peterson."

The foreman got up with a sheepish expression plain to be seen on his face. "By golly, I guess you're right, sir. I—I never thought of that!"



# The Portable Electric Drill

## *Its Use and Method of Repair*

By E. L. Connell, E. E. \*



*This stand converts the portable drill into a bench drill press. Both the stand and drill are of Van Dorn design*

THE portable electric drill is essentially an electric motor and should be given all the protection and consideration usually required for such apparatus. The small sizes in common use are equipped with a universal motor and drive the chuck through a train of gears which reduce the speed from five to twenty-five times. The power is supplied through a flexible cable with lamp socket connection and is controlled by a switch conveniently located on the handle of the drill. Typical machines of medium size are illustrated herewith. One of these drills weighs 10½ lbs. and is capable of drilling 5/16-in. holes as fast as the operator can force it through the work.

The capacity or drilling ability of electric drills is based on the power and

speed requirements of a carbon steel drill drilling in 0.20 to 0.30 carbon steel. It is evident that the capacity of such a machine will vary with the material, also that the speed for maximum production will change with conditions, but by standardizing on the above method of rating the manufacturers have done much to aid the prospective purchaser in comparing and selecting the tool. The maker

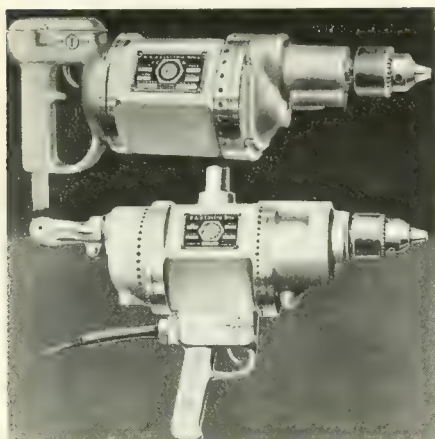
can readily recommend the proper tool for special applications, such as wood boring where the capacity of the tool may vary widely from its rated capacity in steel according to the material, depth of hole, etc.

The speed appearing on the name plate is the free running speed and bears no definite ratio to the speed under load. The speed will drop from 25 to 50 per cent or more under load. It is not generally appreciated that this characteristic automatically adjusts the speed of the machine to correspond with the size of drill being used and the hardness of the material. An operator who has become acquainted with the tool will have no use for a two-speed machine with gear shifting mechanism. The greater simplicity and ruggedness of the single-speed tool would even justify some sacrifice if a compromise were necessary. The important factor in obtaining the best performance from an electric drill is the feed pressure. The feed pressure required for drilling in steel to the full

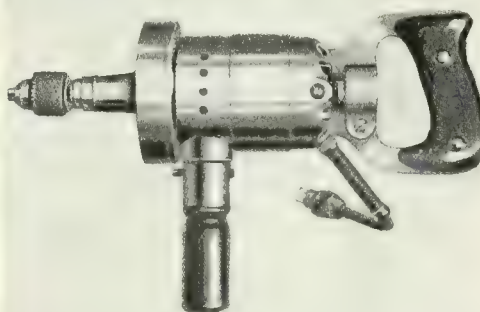
### Minimum Drilling Performance of Universal Portable Electric Drills

Capacity of tool and size drill	Speed	Rate of feed, inches per minute	Horse power at 1 Hp. per cu. in. metal removed per minute
¼ inch	800	1½	.08
⅜ inch	650	1½	.10
½ inch	525	1½	.13
⅝ inch	375	1	.19
¾ inch	300	¾	.23

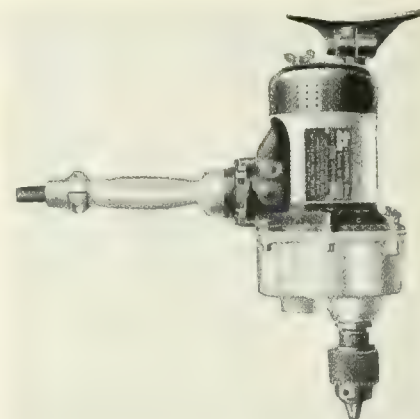
\*Extensive tests have shown this to be a reliable basis for determining power requirements.



*The Black & Decker drills have a pistol grip and trigger switch*



*The Arnold portable electric drill with a pistol grip*



*Another type of electric drill of Thor design*

\*Chief engineer of the Van Dorn Electric Tool Co., Cleveland, Ohio.



capacity of the tool is greater than can be exerted by hand for all except the smallest sizes, and even in the small sizes made by the leaders of the industry there is enough power to operate the drill under all the pressure a heavy man can exert. A pressure of 500 lb. is seldom too much for a 1/2-in. machine drilling in steel. A feed screw is, therefore, usually supplied with the larger sizes.

The minimum drilling performances of a universal drill with carbon steel drills in 0.20 to 0.30 carbon steel should be as indicated in the preceding table. The operating speed represents a cutting speed of 50 ft. per minute.

The free running speed will be about twice the speed given in the above table, except where the tool is designed for a lower cutting speed.

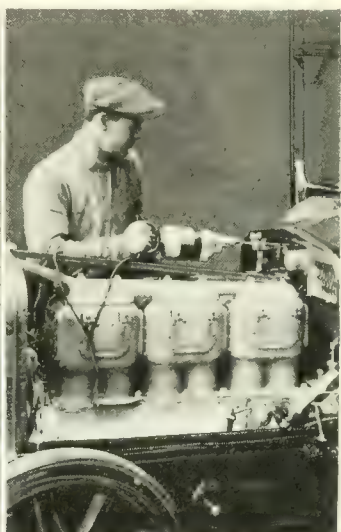
The capacity of the motor should appear on the name plate in amperes

universal motor, the test should always be made on 60 cycles alternating current. A motor of this type is similar to the direct current series motor in its characteristics, but its construction is altered to permit operation on alternating current. These structural differences include lamination of the field magnetic circuit, often a slotted field design with the winding distributed in slots, a high ratio of armature to field turns, and a large displacement of the brushes from neutral position. These special features are all used to reduce the reaction of the windings and maintain the power on alternating current. The power on alternating current will always be less than that obtained with the same direct current input. Manufacturers of this type of motor usually do not recommend them for use on frequencies over 60 cycles because the efficiency drops very rapidly with increasing frequency. The lower

the normal current may overheat the brush. The life of the brushes cannot be stated in ordinary terms because of the very great variation in the use of the tool. However, it is best to examine the brushes before the expiration of 200 hrs. actual running time, and it will be a help to clean the commutator with fine sandpaper several times during the life of the brush. The tension on the brushes should be uniform and just sufficient to prevent arcing on a smooth commutator. A tension of at least 4 lbs. per square inch of brush contact is usually necessary. Should the commutator become rough the armature should be removed and the commutator refinished by taking a very light cut on a lathe.

All reputable tools of this type have enough power to absolutely prevent stalling except under accidental circumstances. When this does happen

*Saving Time in the Truck Shop With Portable Electric Drills*



*A U. S. drill being used during the engine overhauling period*

*Portable electric drills save time in body building or repairing. The above cuts show two types of Van Dorn drills especially adapted for the work*

and the motor should be capable of carrying this load for 30 min. without overheating. Insofar as the motor is concerned, the temperature reached in this time may be 50 deg. Cen. (90 deg. Fahr.) above the room temperature. The high armature speed gives an excellent opportunity to make use of forced ventilation, and with a well designed fan the cooling system is very efficient. The nature of the work is such that full capacity of the motor is never required for 30 min. without relief, so if the tool will stand this test there will be no objectionable heating.

The ampere capacity is not always given, in which case a test by competent engineers is the only methods of checking the power and heating characteristics. The efficiency will vary between 40 and 60 per cent, according to size and design, at a load which reduces the speed to about the figure given in preceding table. An approximate check may be made on this basis.

In checking the performance of a

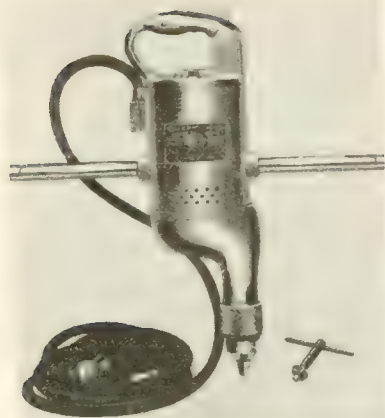
the frequency the more nearly do the characteristics on alternating and direct current coincide. It will be found that when the machine is operated on high frequency circuits the power will be deficient and the heating excessive.

The brushes used on such motors are chosen after exhaustive tests on the part of the maker to obtain the best performance and the longest life. It is, therefore, imperative that only such brushes be used as are furnished by the maker for the particular machine. A brush made from any material at hand may ruin the motor. Some of the effects possible are overheating from friction, sparking or high resistance. If the material is too hard the friction and wear on the commutator is excessive and if too soft the mica may wear high and bring on chattering and destructive sparking. If the resistance of the brush is too low excessive short circuit current will cause sparking and overheating of the commutator and armature coils; and if the resistance is too high

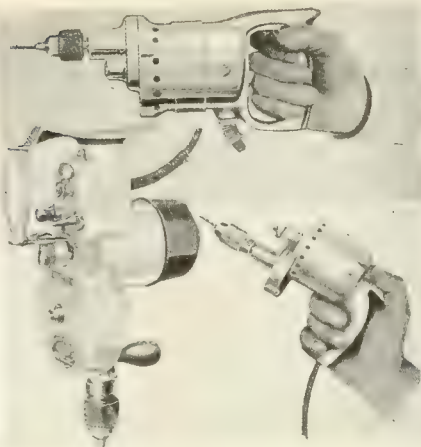
through bending a drill or other accident the power should be cut off as soon as possible. Momentary stalling of this kind will not injure a well-designed machine. The part most apt to fail under these circumstances is the switch, which must then act like a circuit breaker. Quick break and generous contact area are very important requirements. Some tools are equipped with fuses for such emergencies but as the operator usually replaces them with copper wire because a fuse is not immediately available, their practical value is rather doubtful.

Sometimes when drilling sheet metal the lip of the drill will catch as it breaks through, stalling the machine. This trouble can be prevented by grinding the drill especially for this work. The angle of the point should be reduced to give a longer point, 59 deg. is the standard angle, and the sharp angle at the cutting edge should be ground off slightly to give the same result as a smaller angle of the spiral flute to the axis of the drill.





The quick make and break switch in the Wodack drill is operated with the palm of the hand



Upper—Petersen portable drill with pistol grip. Left—Temco drill. Right—One-Hand-Y drill

This latter procedure alone may also help to prevent "grabbing" in soft material and will allow high feed pressures without chipping the cutting edges in very hard material. For drilling in wood the type of drill will depend upon the condition and kind of wood and the depth of the hole. Very deep holes require the ship auger. When drilling green wood the hole should be cleared several times if the depth of the hole is many times the diameter. In soft, dry wood the speed and size of the hole which can be drilled with these little machines is amazing. This matter of choosing and conditioning the drill is a very important one and can best be solved by the mechanic on the job.

The better class of tools are grease lubricated which means maximum cleanliness and minimum attention. It is good practice to replenish the grease supply as often as the tool is cleaned or inspected, which on account of the brush wear should not exceed 200 hrs. of service.

In the case of machines which have ball bearing armatures, the armatures operate without load at from 10,000 to 18,000 r.p.m. and a poor bearing would mean destructive vibration. On the slow speed members, the compound gear shaft and chuck spindle, plain bronze bearings of ample size have given perfect service but there is a tendency toward the use of ball bearings on these members as well.

The danger in this move is in the overloading through lack of room to use bearing of sufficient capacity. The thrust is an important item which must be taken up in a ball bearing of the direct thrust type or of the angular contact type capable of carrying both thrust and radial loads.

The armature is the delicate part of any motor of this type and it is the first part to examine should the machine show signs of distress. Very often a motor is completely burned out through neglect of symptoms of trouble developing. If severe sparking appears at the armature the machine should be taken out of service at once and sent to

a competent electrician for inspection. These motors are subject to the ordinary diseases of electric motors which may be detected in the usual way. Grounds may be detected with the magneto ringer and if no ground is detected in the armature, the field, switch and cable connections should be tested. An open circuit in the armature will be shown by burning between the commutator bars to which the open coil is connected. A short within a coil will burn out the shorted turns and a short between commutator bars will overheat the bars so shorted. A case of short between bars may sometimes be repaired if discovered before the coil is burned by removing the foreign substance between the bars, but an open or shorted coil requires a re-wind. If the armature is built with open slots and form wound coils the repair can often be made economically by the average repairman if he purchases the repair coils from the maker. If the armature is built with semi-closed slots it will probably be best to return to the maker for re-wind. The maker's guarantee of correct re-wind is quite valuable, hence it is strongly recommended that the maker be asked to make repairs.

The fields are not apt to fail but occasionally they are burned out by operating the tool after the armature has failed. A shorted coil will cause over-speed or flashing when the switch is closed. The best tools have windings treated with an impregnating varnish by

an elaborate process which is a very good reason why a re-wind by the maker is preferable. This feature is perhaps more important in the armature than in the field.

The gearing of the best machines seldom gives trouble but they are wearing parts and should be renewable with the least trouble and expense. The removable armature pinion is a very valuable feature since it permits renewal of this part without the cost of a new shaft and re-wind which is the case when the pinion is integral with the shaft. This objection is still worse when the commutator is built upon the shaft.

The cable connection is very often abused by using it to drag the tool around, running trucks over it, etc. Some cable is better than others but all of it requires reasonable consideration and where the tool is used in one position on production work it is recommended that the tool and cable be suspended from above with a counter weight. The machine is then always accessible and free from cable abuse. Some tools are provided with terminal screws at which a new cable can be attached without the aid of a soldering iron.

The weight of portable electric drill is an important consideration. Weight is reduced by increasing the armature speed, by the use of aluminum housings and by the use of the best steels properly treated. A radical armature speed will shorten the life of the tool and the only assurance of proper design and material in the gear train is the reputation of the maker. It should also be borne in mind that the aluminum housings may be crushed by pounding or dropping the tool. To the reader such caution may be unnecessary but it is appalling what abuse some tools receive in this manner.

The portable electric drill as manufactured by the recognized leaders in the industry should not be classed with the vacuum cleaner and other domestic appliances. They are built to machine tool accuracy of the finest materials and distributed in a manner that gives the purchaser much more for his money than is possible in the aforesaid lines. They are built by mechanics for the use of mechanics; they are a practical, rugged machine that will save many hours in miscellaneous drilling operations and are indispensable in production where the drill must be taken to the work.

## The Rules for Truck Lubrication

IT is conceded that most of the work in truck repair shops is due to improper or insufficient lubrication. As a result every man in charge of a truck should be thoroughly familiar with the lubricating requirements. He should know the kind of lubricant to apply; how often to renew the oil or grease; and should pay particular attention to the oil indicator in the crankcase or on the dash. He should remember that there are other important parts besides the engine that need lubricating attention, for instance,

the spring bolts, steering gear, clutch pedal, shaft, radius rods, and torque arm.

As a certain amount of gasoline is bound to work past the piston rings and dilute the lubricating oil, it is therefore important that the crankcase oil be changed at least every 500 miles. He should examine the withdrawn oil carefully. Finding broken gear teeth or other loose metallic parts indicates that a thorough investigation and possible replacement of parts is very frequently necessary.



*You Are Sorry for a Blind Man! You Would Spend Money to Help Him! But—*

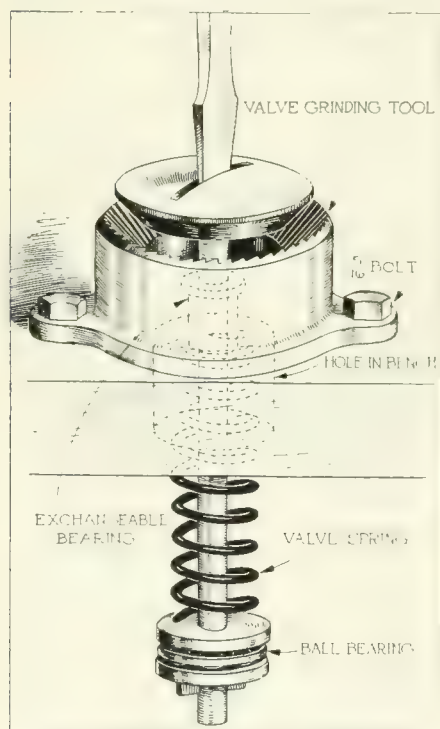
But in very few instances was the desired information available. Fortunately, the state commissions were inclined to be fair—so much so that in some states adherence to the base rates, which were fixed, helped to make it possible for operators who had properly selected their routes to make a profit. However, this was not true in all instances, and in any case, motor trucking is a comparatively new business and this condition will not and should not prevail forever.

# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 439—The Better Way to Repair Valves

HERE is a tool for refacing valves which is not only simple to install but which will save a lot of time and expense in these repairs in the garage. As the accompanying illustration shows, the tool is a cutting tool the same size and shape as a valve seat, with the cutting teeth occupying the place of the smooth valve seat at the same angle as the face of the valve seat, (30 degrees from the horizontal). The tool is bolted to the work bench with two or three



No. 439—Repairing Valves

bolts. In the main hole is fitted a bearing, variable with the diameter of the valve stem. The spring used in reseating the valve is the same spring which is mounted with the valve in the engine. The top end of the spring rests against the bottom of the tool which does not turn. The bottom of the spring rests against the circular plate which runs on a ball-bearing which in turn rests against another circular plate about the bottom of the valve stem and held in place by the valve spring pin. This arrangement keeps the valve face tight against the teeth. If the valve is re-

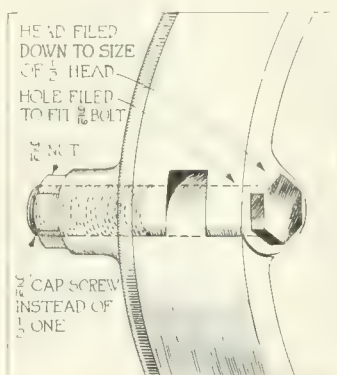
**T**O help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

involved with an ordinary screw driver a few times, the result will be a clean planed valve face very difficult to attain with ordinary emery and the ordinary method. Moreover, the tool is simple, inexpensive and easy to install and operate.—ROSSI SEVERINO, Torino, Italy.

## No. 440—When Shoe-Stud Hole Gets Badly Worn

I T sometimes happens that the emergency brake shoe stud hole on a Ford truck gets so badly worn in the housing

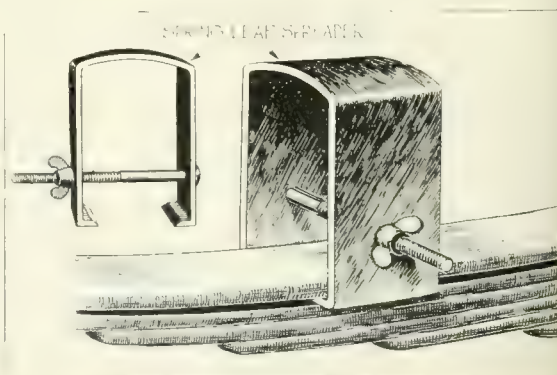


No. 440—New Stud Hole

flange for the brake, that it is practically impossible to replace it with a new one of the same size. In order to save time and expense in such an emergency, take a 9/16 in. tap S. A. E. and run it through the worn hole. Then take a 9/16 in. cap screw and cut down the head of it to the same size as the head of the original 1/2-in. bolt, or a little bit larger if necessary. Run the thread down just far enough to allow play for the brake shoe. Then screw in the same as far as the thread and tighten up the nut. Take a 5/8 in. round file and file a hole in the brake shoe to make a good fit for the 9/16 in. stud. This will make as good and strong a job as before. Note the accompanying illustration for the dimensions and method of application.—F. J. OGDEN, Shillito's Garage, Cincinnati, Ohio.

## No. 441—Home-Made Spring Leaf Spreader

EVERY mechanic and most fleet owners know that a truck will ride more easily and the springs will last longer, to say nothing of the fact that the truck itself will last longer, if the spring leaves are kept thoroughly lubricated. But it often happens that the spring leaves are not thoroughly oiled or greased because of the difficulty of getting the oil or grease between the leaves. Here is a home-made spring leaf spreader which will obviate this difficulty. Take a piece of band steel about 2 in. wide and bend it into a U shape, as shown in the accompanying illustration. Bend the ends again so that they project inward from 1/2 in. to 3/4 in. Then file these projections to chisel edges. Next, bore two holes through the U and insert a long bolt with a wing nut on the outside, as shown. To use



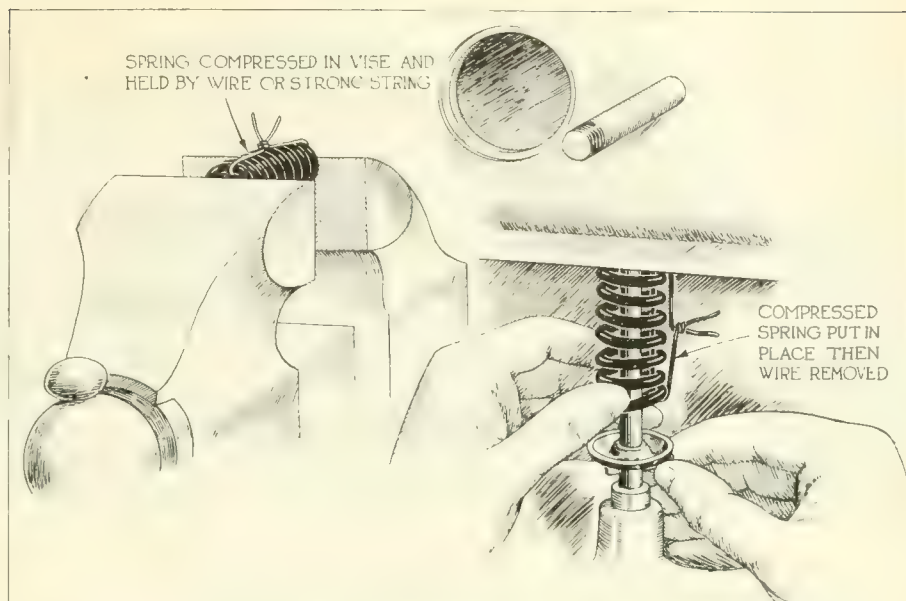
No. 441—Spring Leaf Spreader



the tool, the projections are inserted between the leaves of the spring and the wing nut is turned up until the leaves are spread apart. Then oil and grease or graphite may be easily inserted between the leaves.—PAUL H. KOENIG, Scudders-Gale Grocer Co., St. Louis, Mo.

### No. 442—Springs Cannot Damage Fingers

**M**OTOR truck mechanics know that removing the valves from their places is anything but an infrequent operation. Moreover, the operation usually involves the same old difficulty of compressing the valve springs sufficiently to place the pins in the valve stems after grinding the valves. But mechanics can save much time and temper if, when removing the valves, the springs are removed also and the following procedure carried out. Place each of the springs in a vise and compress it. Then, while it is compressed, run a piece of wire or a strong string lengthwise through the spring on each side and tie it, so that when the spring is removed from the vise, the wire or string will prevent the spring from expanding. Follow this process with each of the springs. When you have finished grinding the valves, it is a simple matter to slip the spring over the valve stem and replace the latter and also the pin. When all the valves and springs and pins have been replaced, cut the wire or string on each spring and the springs will jump into place, without difficulty and without damage to the fingers.—JOHN L. COATES, Springfield, Mass.



No. 442—Compressing Valve Springs

is cut into two parts, one about 10 in. long and the other about 14 in. long. These two sections are then fastened together with the hinge as the illustration shows, six long screws being used for this purpose. The next step is to round out or shape the upper end of the shorter section so that it will fit the hub of the wheel. Then shape one end of the 42 in. piece into a handle and fasten the other end of it to the 14 in. section of the 2 x 4 by means of the three bolts. The jack is then complete. The illustration indicates the dimensions and the method of application.—PAUL H. KOENIG, Scudders-Gale Grocer Co., St. Louis, Mo.

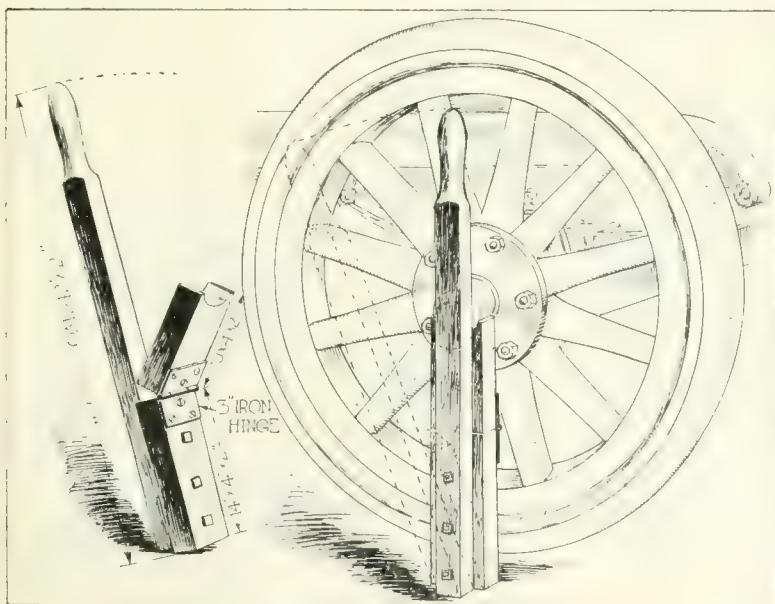
### No. 443—Speedy Home-Made Truck Wheel Jack

**T**HE hub jack shown in the accompanying illustration is made from a section of 2 x 4 lumber, 24 in. long, a piece of oak 2 x 2 lumber, 42 in. long, a 3 in. iron hinge and three bolts about 4 in. long. The section of 2 x 4 lumber

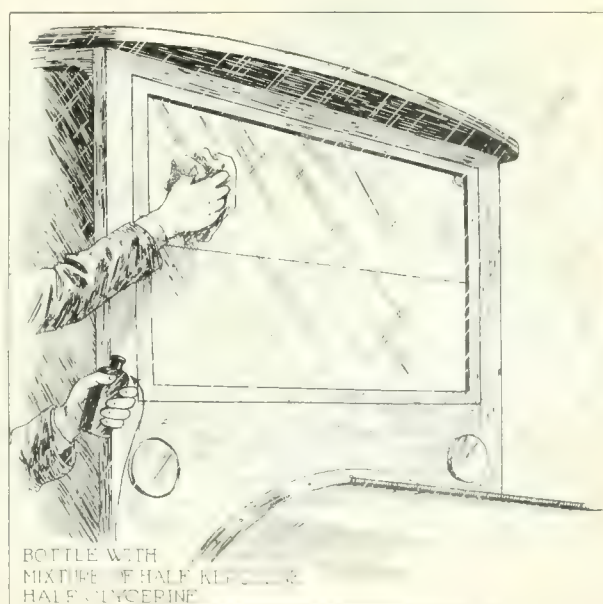
### No. 444—Keeping the Windshield Clean

**M**ORE than one accident to trucks has been caused by the fact that the driver's vision is obscured by drops

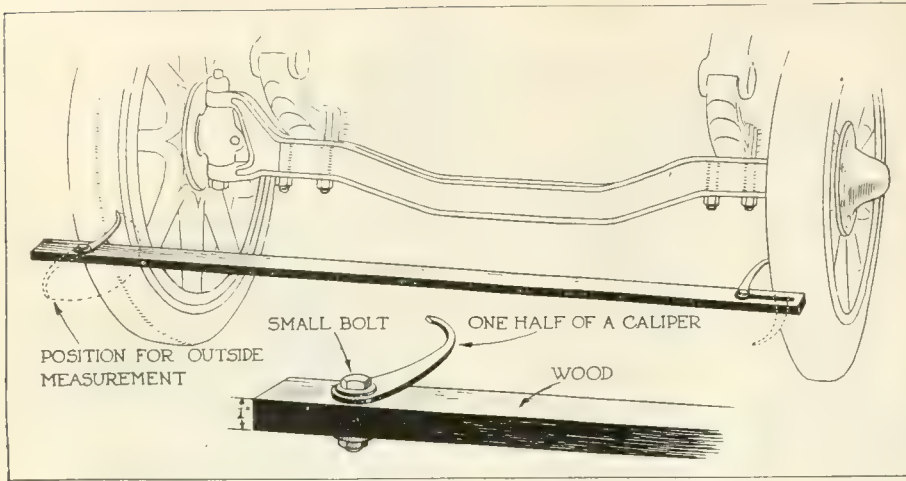
of rain on the windshield. But one fleet owner-mechanic has worked out a method to prevent this. A very good method to keep the windshield from clouding and becoming covered with drops is to rub a half and half mixture of kerosene and glycerine on the glass. A small bottle of this mixture, tightly corked and placed in a small can with some waste should be carried on every truck in a convenient place. Then whenever it rains, the driver can pour a small amount of the mixture onto the waste and rub it over the damp or wet side of the glass windshield. The mixture causes the water on the windshield to spread out evenly over the glass instead of collecting into drops which obscure the vision. Many accidents may be prevented in this way, as, when the glass is covered with raindrops, it is difficult to see very far ahead of the truck.—PAUL H. KOENIG, The Scudders-Gale Grocer Co., St. Louis, Mo.



No. 443—Truck Wheel Jack



No. 444—Windshield Cleaner



No. 445—Calipers for Wheel Gage

### No. 445—Calipers Used to Make Wheel Gage

**T**OO much stress cannot be laid upon the importance to tire costs of having the front wheels of the trucks in as nearly as possible perfect alignment all the time. This is not always possible, but much can be done to save undue tire costs by checking up the alignment of the front wheels at frequent intervals. The following is the description of a home-made tire gage which can be readily constructed in the shop if no standard gage is available. The gage is constructed of 1 in. wood slightly longer than the distance between the outside edges of the two front tires. One end of the wood is slotted for 3 or 4 in. as shown. To the wood two calipers are bolted one at each end, one caliper being bolted into the slot, so that loosening the bolt will permit the operator to slide the caliper along in the wood. By loosening the two bolts, the gage can thus be used to measure the truck tread, either on the

inside or on the outside of the tires or the felloes as the illustration shows.—R. L. BROWN, West Orange, N. J.

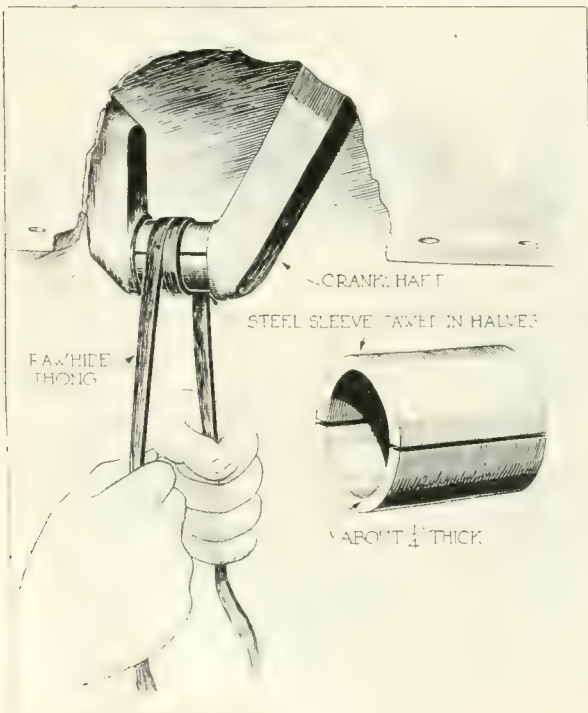
### No. 446—Method of Truing Up Burnt Crankshaft Bearing

**W**HEN one of the crankshaft bearings is burnt out through faulty lubrication and it becomes necessary to install a new connecting rod bearing, it may also be necessary to true up the crankshaft bearing surface before the new bearing is installed. The accompanying illustration indicates a simple method of accomplishing this work. A sleeve of steel about  $\frac{1}{4}$  in. thick is turned up on the lathe and bored out the exact size of the bearing. The sleeve stock should be at least  $\frac{1}{4}$  in. thick so that it will have no spring. It is then sawed longitudinally into two halves and the two sections are placed about the crankshaft bearing, as shown. A rawhide thong or narrow section of belting is then placed about the sleeve and the

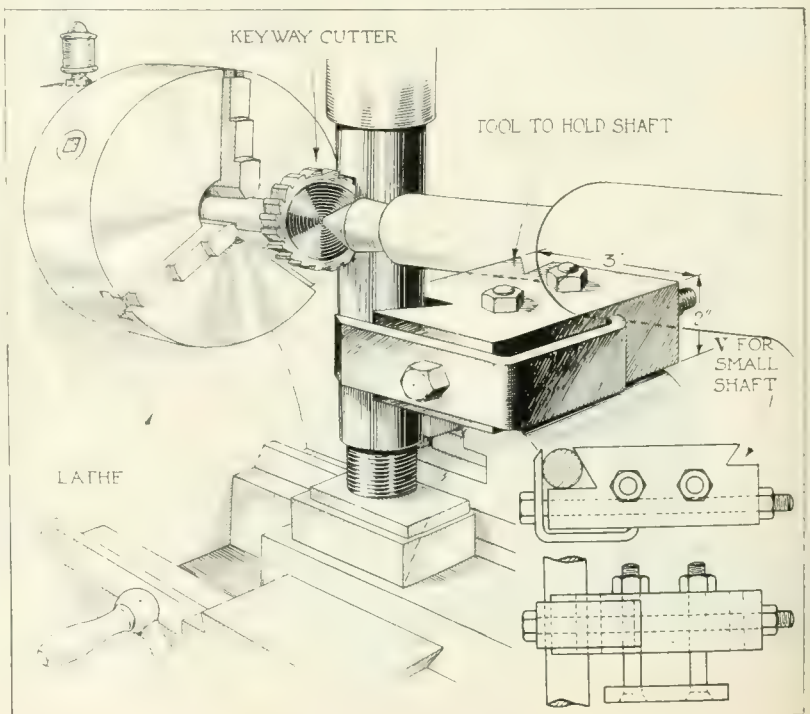
two ends of this are used to revolve the sleeve about the bearing. Valve grinding compound is used as the abrasive. This method was used by the writer a number of times and in each case an excellent bearing was produced. Moreover the labor, time and expense of taking out the crankshaft and grinding it was dispensed with.—L. McELROY, Detroit.

### No. 447—Cutting Keyways in Parts and Tools

**C**UTTING Woodruff keyways in shafting, etc., on a lathe, can easily be accomplished with a home-made chuck mounted on top of the tool rest of the carriage of the lathe, as shown in the accompanying illustration. The tool post is removed and the chuck attached in its place. A piece of steel about 2 in. by 3 in. is used, the length to be about 3 in. longer than the tool rest base. Two sections are cut out of the chuck, one at each end to hold the shaft in which the keyway is to be cut. One of these is 2 in. across for large shafts and the other is 1 in. across for smaller shafts. A piece of steel is fastened to the chuck with a screw, as shown, to prevent it from turning in the tool post holder base. The chuck has a hole at the top and bottom for this screw. This is necessary for changing the chuck around, according to which slot is required nearest the lathe spindle, when the keyway is to be cut. A clamp is constructed to hold the shafting to the chuck. A hole is drilled all the way through the chuck for a bolt to hold this clamp. The Woodruff keyway cutter is held in the lathe spindle with a drill chuck. The shaft to be cut is held in a vertical position. The cross feed of the lathe is used to cut the keyway. Note the vertical and horizontal sectional views of the chuck with shafting held in it.—GEORGE HERON, The Boston Store, Chicago.



No. 446—Truing Crankshaft Bearing



No. 447—Cutting Keyways





### Specially Designed Bodies for Collection of Garbage

Many cities are purchasing motor trucks for use in collecting garbage. The City of Madison, Wis., has placed in service Winther chassis fitted with garbage bodies and hydraulic hoists for dumping them. The bodies and hoists are manufactured by the Heil Co., Milwaukee, Wis. The bodies have six covers, the front four opening from the sides and the rear two from the back. Adjustable steps on either side and the rear make it easy to load the body. Ten-gage steel is used in the construction of the bodies with 12-gage steel in the covers. The bodies are first riveted and then all the seams are welded. This prevents liquid garbage from dripping on the street. The tailgate is hinged at the top so that it swings outward when released. Four wing nuts are used to keep it tight in place when the body is loaded. Rubber packing is used between the tailgate and the body. The body itself is 3 in. wider at the rear than the front so the load will dump freely.

## Luverne Road Graveler Body Has Hopper Bottom

THE Luverne Motor Truck Co., Luverne, Minn., has placed on the market a new model called the Luverne Road Graveler, equipped with two sizes of a specially designed body. The chassis frame in back of the cab is designed so that there are no crosspieces or parts of any kind under the chassis, other than the rear axle and propeller shaft.

The body design includes a hopper bottom. There are divisions running through the lower part of the body to form a housing for the rear axle and for the propeller shaft. This leaves four separate hoppers in the bottom of the body. The extreme bottom of the body is 12 in. below the top of the frame.

There are hinged bottoms on each of the four hoppers. All of these hinged bottoms are connected to rocker shafts mounted in the upper part of the body, and these rocker shafts are in turn connected to a hand lever located in the cab at the driver's left.

This hand lever operates on the eccentric principle, passing by a center as moved forward or back, thus positively locking the bottoms up in position for carrying the load.

The dumping of the load is governed entirely by the driver, who may throw the lever clear over and drop the whole load instantly or he can throw it only partly open and distribute the load over a considerable distance.

The light weight of the bodies and chassis makes possible the use of pneumatic tires, thus permitting high speed and the overcoming of bad road condi-

tions. The weight of the 1½-yd. body and chassis is 4000 lb. The 2-yd. size weighs 4800 lb.

The bodies are made entirely of wood, properly reinforced with steel corners and braces. The sides flare sufficiently to provide for wide upper part, and for lower part to fit inside of the chassis frame. The peaked top housing extends crossways and lengthwise, covering the axle and driveshaft and thus fully protecting them from any part of the load being dumped on them.

Model No. 4 Luverne truck uses the 1½-yd. body and is equipped with a four-cylinder G.B.S., 3¾ by 4¼-in. engine; three-speed gearset, Torbensen rear axle, 5-in. channel steel frame, giant cord 36 by 6-in. tires, and a semi-enclosed type of cab.

Model No. 6 uses the 2-yd. body and is equipped with a six-cylinder Continental 3½ by 5¼-in. engine, three-speed gearset, 6-in. channel steel frame, giant cord 38 by 7-in. tires, and a fully enclosed cab with drop windows.



Dumping of the load in the Luverne hopper body is governed entirely by the driver, who may dispose of the whole load instantly or distribute it over a considerable distance

# Accessibility a Feature of 1-Ton Gramm-Bernstein

## Speed Truck Equipped with Wood Disk Wheels

**S**IMPLICITY and accessibility of design are apparent throughout in the new Gramm-Bernstein 1-ton speed truck, which should contribute greatly to easy and prompt adjustment.

An all-copper and brass radiator, protected by a staunch cast semi-steel shell mounted on the frame with springs, is used instead of the conventional terne plate or galvanized radiator, rigidly mounted.

The powerplant is a high-speed engine with removable head, hot-spot manifold and stove on exhaust pipe for triple heating fuel, and the manufacturers claim unusual efficiency and economy, having obtained an average of over 12½ miles to the gallon of gasoline under full load. One interesting feature of the engine is a construction which permits the valve tappet guides and tappets to be easily removed en bloc. The engine

suspension is semi-flexible, three-point to main frame, with large trunnioned support at front end.

A 10-in. ten spline shaft dry-plate clutch is used, enclosed in unit with the engine. Transmission is sliding gear

roller bearings at the junction of the two sections of high speed shaft.

The propeller shaft is tubular, and the usual Gramm-Bernstein flexible oil-less disk joints are used at both ends.

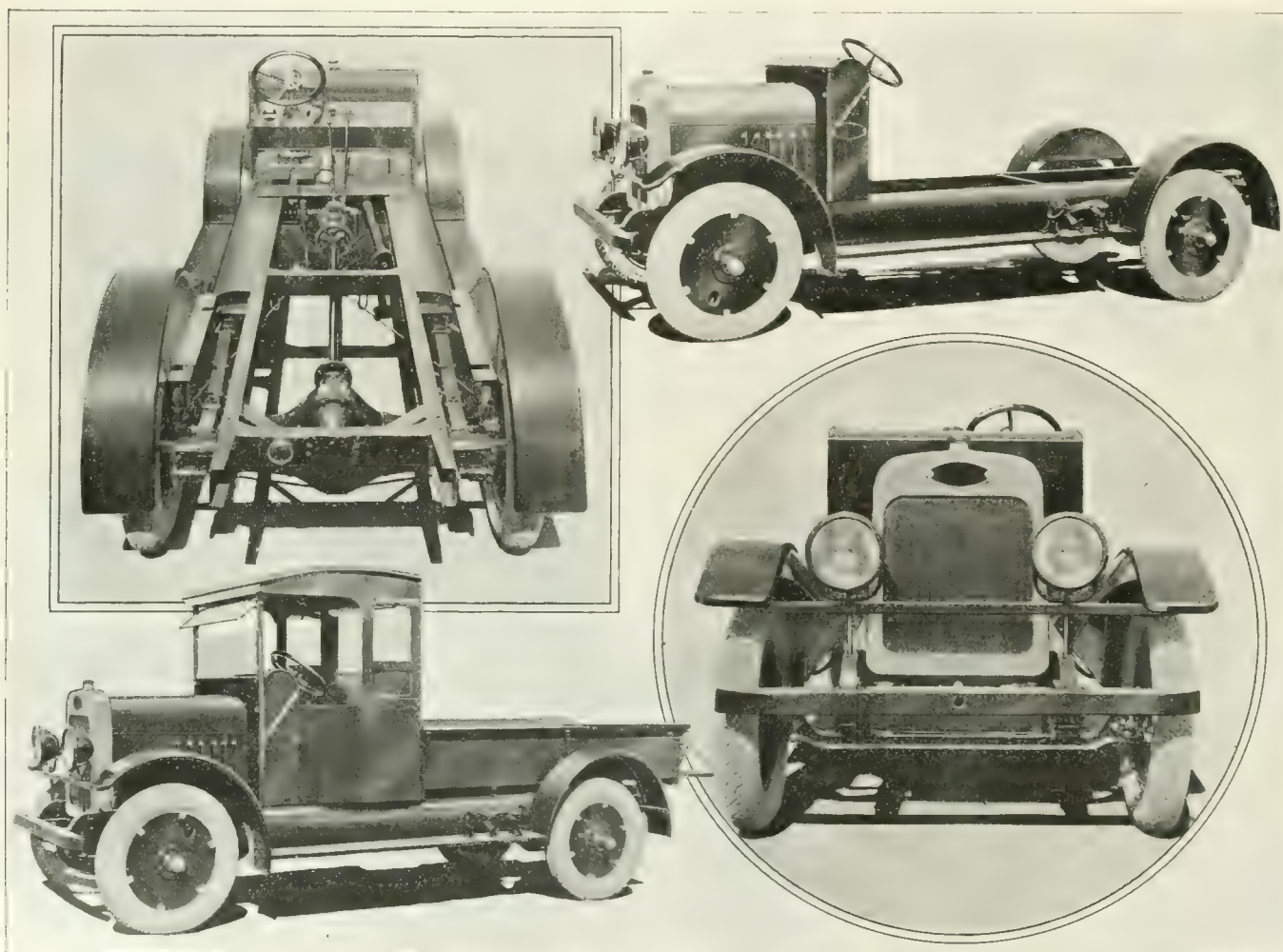
The rear axle is three-quarter floating, bevel type, gears being of helical spiral design, accurately cut and mounted on large annular bearings. The housing is pressed steel with heavy drawn steel tubes and is further strengthened by a well anchored truss rod underneath. The complete differential and carrier is easily removable as a unit after drawing the drive bar by simply unbolting from the housing. Drive bars are ample size, of chrome nickel steel, the wheel bearings being extra large double row annular.

One especially interesting feature of the new Gramm-Bernstein is the airplane type laminated wood disc wheels, nine ply front and eleven ply rear, which the

### GRAMM-BERNSTEIN SPECIFICATIONS

Price .....	\$1,435
Wheelbase, in.....	128
Tires, front.....	33 by 5
Tires, rear.....	33 by 5
Bore, in.....	3½
Stroke, in.....	5
S. A. E. hp.....	19.6
Speed, r.p.m.....	2400
Speed, m.p.h.....	45
Gear ratio in high gear.....	5.75 to 1
Final drive.....	Spiral Bevel

type, three speeds forward and reverse, with nickel steel shafts and ample gear faces, shafts being mounted on double row annular ball bearings with additional



Views of the 1-ton Gramm-Bernstein speed truck, showing its features in design. Note the length of the springs and the straight section pressed steel frame construction



manufacturers claim not only add to the appearance of the truck but also to the life of the tires. It is claimed that sets of these wheels which have been run over 40,000 miles have shown no signs of warp or wear.

Gramm-Bernstein calls particular attention to the springs and frame, the former being of extra length and the latter being a straight section pressed steel channel construction. Following its usual practice, the front end spring hanger is a separate casting, this also providing for lamp and fender supports and anchorage for the bumper, which is channel steel.

The service brake is 16 by 2 in. on the rear wheels with a simple and positive cable and pulley equalizer. The emergency brake is a contracting band on the propeller shaft.

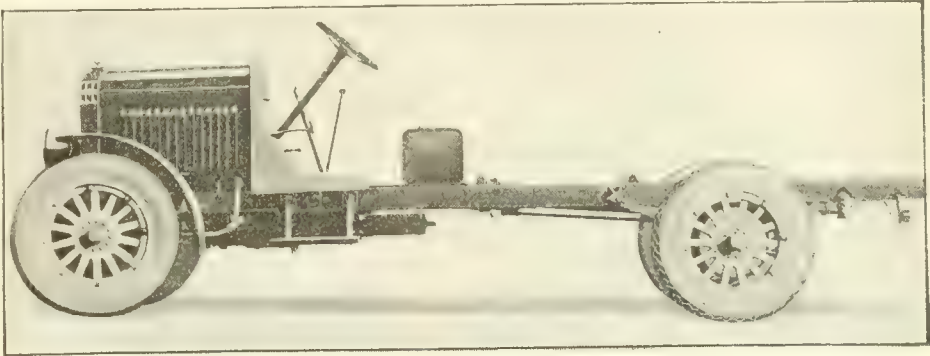
Ignition is Connecticut, with an automatic circuit breaker to prevent battery exhaustion; water circulation is thermosyphon, the large radiator insuring ample cooling; lubrication, combination force feed and splash; gasoline supply, 16½ gal. tank mounted in the dash, insuring strong gravity feed.

Springs are designed to carry flat under rated load and are fitted in each hanger with graphite impregnated oil-less bronze bushings, requiring no further lubrication.

The chassis with 35 by 5 in. tires front and rear, electric lights and starter, speedometer, compression whistle, front and rear fenders with running-boards and dust shields, bumper, jack, pump and full set of tools, front and rear license brackets, spare rim, etc., is sold at \$1495; and the truck is listed in sixteen combinations of bodies and equipment, ranging up to \$1,780. Painting is included in price.

# New 1-Ton Speed Truck Being Built by Kissel

*Equipment Includes a Worm-Driven Rear Axle, and Pneumatic Tires, Has Speed of 35 M.P.H.*



*The new 1-ton worm-driven Kissel speed truck*

**KISSEL SPECIFICATIONS**

Price, chassis	\$1,585
Wheelbase, in.	140
Tires, front	34 by 5
Tires, rear	34 by 5
Bore, in.	3 7/8
Stroke, in.	5 1/2
S. A. E. hp.	21.2
Speed, m.p.h.	35
Final drive	Worm

this being of the four-cylinder type.

The dry plate clutch and three-speed gearset are in a unit with the engine, exactly as in the larger models. The rear axles is a Timken worm drive.

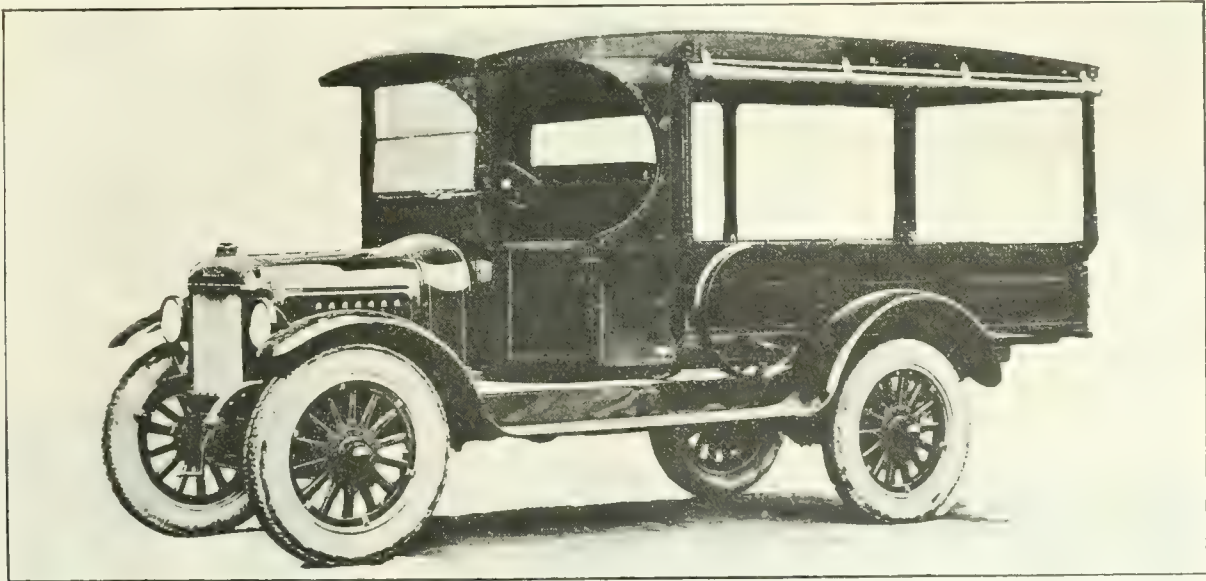
For the stripped chassis and standard equipment without seats but including two oil lamps, tail lamp, jack, complete set of tools, gasoline tank and pneumatic tires, the price is \$1,585. For the chassis and body complete, including all extras such as electric lights and starter, canopy body and top, cord tires and painted complete, the price is \$1,985.

Other specifications include a tubular radiator and half-elliptic springs. The length in back of seat is 8 ft. 6 in.

In addition to the four larger truck models, the Kissel Motor Car Co., Hartford, Wis., is now producing a 1-ton speed truck with a worm-driven rear axle and pneumatic tires.

The engine is the same as that used in the general utility 1½-ton model,

## Republic "10 Express" a 1-Tonner Mounted with Pneumatics



*The new Model 10 Express made by the Republic Motor Truck Co., Alma, Mich., is a 1-tonner mounted with pneumatics. It is assembled with well known units such as a Continental Red Seal engine, Republic-Torbensen internal gear-driven rear axle, Delco electric lighting system and Bosch magneto. The model is furnished with two styles of express body, either open or canopy top, an extra tire carrier and rim being included with both styles*

# Accessories and Parts

## Niagara Motor Cooler

**T**HE Niagara Motor Cooler is a water circulating pump for Ford engines, solidly constructed of cast iron, brass and bronze. The pump weighs about 8 lb. net. It is designed to efficiently prevent overheating of Ford engines, when operated at any speed. It is stated that it will also prevent freezing by keeping the water well circulated. By maintaining a uniform water temperature the power efficiency is increased and lubrication and gasoline consumption decreased.

Should the pump become inoperative it will cause no damage, as the thermosyphon system will function just the same as it did before the pump was attached.

It is installed by first removing the pipe with elbow between the radiator and engine. The cooler is then installed in place of the pipe. The fan arm is lowered as far as possible and the fan belt is placed over the pulley, after which the slack in the fan belt is adjusted. The cooler is then ready to operate.

The price is \$12, and the maker is the Niagara Motor Cooler Co., Niagara Falls, N. Y.

## New All-Steel Truck Body

**T**HE Columbian all-steel dump body is practically one piece, for the individual parts are welded together electrically. The longitudinal sills and cross sills, being formed into a girder-like construction, provide a rigid bed to which the body itself is welded. This construction gives a smooth interior which is an advantage when hauling clay and similar materials as there is very little tendency for the load to adhere to the body when it is tilted.

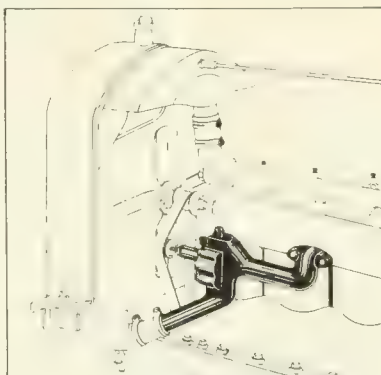
Another feature is the double-acting tailgate which can be opened either from the bottom or the top. When opened from the top the two cotter pins are removed as shown in the accompanying illustration and the opening may then be regulated by the adjusted chain.

The only wood employed are the narrow oak sills which act as buffer strips between the sub-frame of the body and frame of the truck. These are furnished already hinged to the body and may be

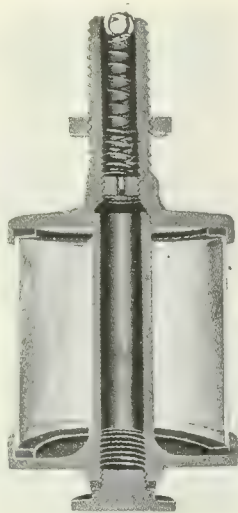
obtained a little longer than the length of the body in order to provide for a mounting of the hoist. All that is necessary in order to attach the body is to lay it on the frame of the chassis and attach the U-bolts that are furnished.

## Lea Oil Dilution Gage

**T**HIS is a simple gage having only one moving part. It indicates a predetermined amount of dilution of the crankcase oil and shows at once when oil should be changed. It is adjusted to work on any good grade of cylinder oil.



*Niagara motor cooler*



*Kelly ball oil cup*

It indicates at the same time, whether the circulating system is operating. When lower compartment is full of oil, and no red signal shows, the dilution is not dangerous and the pump is working. When the red signal shows and the gage is full of oil, too much dilution has occurred and the oil should be changed. When the red signal shows and the gage is empty, the circulating system has stopped. When the circulating system is working the incoming oil is thrown against the glass, and is distinctly indicated.

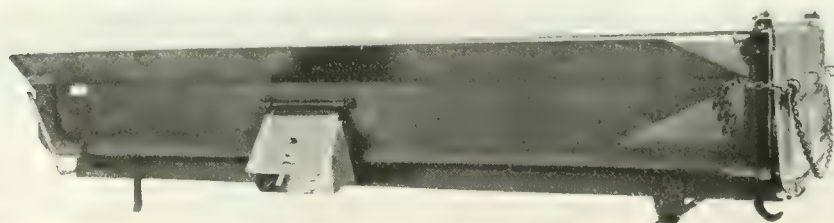
The oil enters the gage at A from the circulating system and is discharged against the glass at B. It overflows at C, and returns to bottom of crankcase, through opening E, level being constantly maintained against diaphragm F. Auxiliary outlet D discharges part of oil at all times, allowing heavy oil in bottom of gage to be replaced as dilution proceeds, and also empties gage when the engine stops. Float G remains on top of oil as long as dilution of oil is not too great, and signal H is invisible. When dilution becomes too great, or circulation stops the float drops and red signal becomes visible.

E. S. Lea, Lafayette and Peace streets, Trenton, N. J., is the maker.

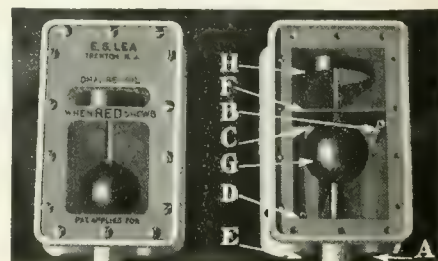
## Kelly Ball Oil Cup

**T**HE maker of the Kelly ball lubricator for shafts in machine shops has been experimenting for the last 6 months on an oil cup to replace the grease cups on trucks which would feed oil only when oil was needed. In other words, it is automatic, the idea being to eliminate the necessity of constantly going over the truck with the oil can to refill oil cups or to eliminate the constant screwing down of grease cups. On test the maker found that one filling of the ¼ oz. brass cup would run a Franklin car approximately 4000 miles.

The operation of this cup is caused by vibration or jump. There is a small steel ball placed in the bottom of the stem and as the truck goes over rough roads this ball is thrown upward allowing a drop of oil to drop while the ball is suspended. The amount of oil necessary is regulated



*Columbian all-steel truck body*



*Lea oil dilution gage*



by a set screw, which determines the amount of jump the ball is allowed. When the truck is standing idle or going over smooth road, no oil is necessary.

This cup will be placed on the market soon by the Syracuse Sales Corp., Syracuse, N. Y.

### Penberthy FloMeter

THIS device is located on the instrument board and tells the actual amount of gasoline that is being consumed at any moment of reading in gallons per hour. In the same way the miles per hour are shown by the speedometer, and when used in conjunction with FloMeter, the consumption of gasoline in miles per gallon is known accurately at the time of reading.

By the use of this instrument, the driver or mechanic can adjust a carbureter to the most efficient setting by simply screwing the adjustment one way or another until the speedometer shows the maximum number of miles and the FloMeter registers the minimum flow of gas. The maker is the Penberthy Injector Co., Detroit.

### Universal Shock Absorber

THE springs in the Universal shock absorber for Fords are enclosed for protection and appearance. Eight shackle bolts for installation are furnished with each set. The finish is black enamel baked on. The illustration explains its application and operation. The maker is the Universal Sales Co., 507 Odd Fellow Bldg., Indianapolis.

### Johnston Piston and Ring

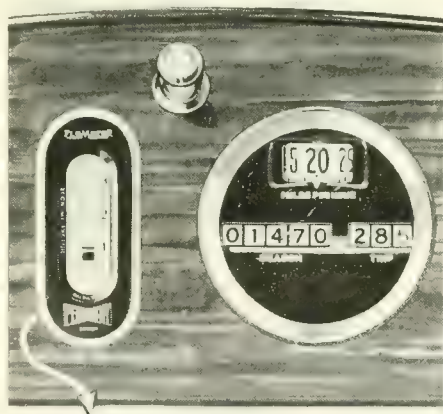
THE Johnston piston and ring operate on the principle of the check valve, giving maximum compression and holding it to the very last of the stroke. This is accomplished as follows: The piston, as close study of the illustration will show, has a domed and cutaway head which permits the force of the explosion to center on the top ring. This, as will be noticed, is not the conventional rectangular type but cuts away downward at an angle of 35 deg. The piston groove is cut at a corresponding angle and when the force of the expanding gas strikes the ring it is impelled downward and therefore outward against the surface

of the cylinder wall. The lower ring is inverted and has the same action on the suction stroke, thus giving higher compression and making it virtually impossible for the fuel to escape into the crankcase and dilute the lubricating oil.

Tests of this ring and piston have been made primarily for Ford engines because this size will be manufactured first by the Hall Scott Motor Car Co., Berkeley, Cal. The standard Ford piston is  $3\frac{3}{4}$  in. in length as compared with  $2\frac{3}{4}$  in. for the Johnston piston, it having been found possible to cut an inch from the skirt because the new rings hold the piston perfectly centered without slap. The Ford piston weighs 2 lb.  $14\frac{1}{4}$  oz., as compared with 1 lb.  $8\frac{3}{4}$  oz. for the Johnston piston.



Johnston piston and ring



Penberthy FloMeter

### Forc-Ful Lubricator

INSTEAD of soiling the hands trying to screw down the caps of a dozen or more grease cups, it is only necessary to screw the nozzle of the Forc-Ful lubricator into the special connections provided, and by turning down the plunger handle, force grease in and through the bearings under a pressure of 500 lb. to the square inch.

This lubricator equipment includes a screw plunger grease gun with automatically closed nozzle, and fittings for all parts of a Ford designed for hard grease lubrication, as follows: four straight line connections for rear transmission bearing, universal joint and two rear wheel bearings; one special straight connection for the differential housing; two elbow connections for the differential housing; two elbow connections, one each for the fan and steering post bearings; and four special elbow connections for the steering pins, or king bolts, and tie rod bolts. This lubricator is also designed for lubricating the wheels of a Ford. The end cap of the device is removed and the barrel filled with grease, is screwed on the hub in place of the cap, and after thoroughly seated on all the threads, the plunger is screwed down and the entire contents of the lubricator may be, if desired, forced into the hub, pushing the old grease out ahead of it through opening around inner wheel bearing.

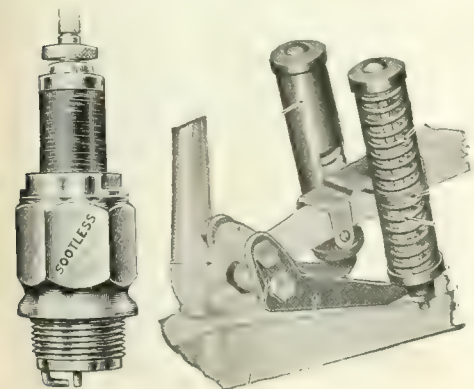
The maker is the I. C. Mfg. Co., the sales being handled by the Zinke Co., 1323 Michigan Avenue, Chicago.

### Sootless Spark Plug

THE mica on the firing end of this plug is protected by a porcelain cap so arranged and enclosed that it is protected against breakage. These plugs are made in sizes to fit all trucks. The maker is the Oakes & Dow Co., 307 Atlantic Avenue, Boston.

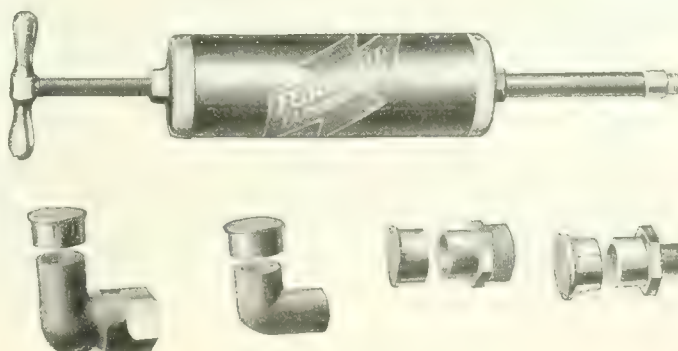
### La-Lo Lubricant

LA-LO lubricant replaces all greases and heavy oils and is featured by its lasting qualities. It is stated that it will not run or throw off by centrifugal force and that its efficiency is not affected by heat, cold or salt water. It is made in proper densities for Ford differentials, chain drives and starting systems; grease cups, spring leaves, shackles, bolts, etc. The manufacturer is the La-Lo Chemical Co., Providence, R. I.



Sootless spark plug

Universal shock absorber



Forc-Ful lubricator



# Shop Equipment

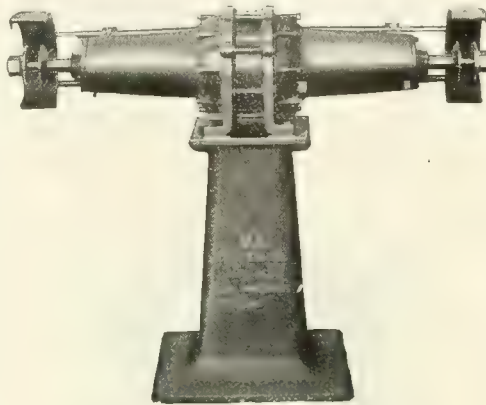
*Time and Money Saved  
in Truck Repairs*

## C & J Lathe

THE new 14-in. C & J quick change gear lathe is equipped with either a single or double back gear. It has a 15¼-in. swing and will cut threads from 3 to 64 per inch. One handle and knob does it all. All standard and odd threads can be cut up to 64 per inch, including 11½-in. pipe threads, right or left hand. The apron has reverse in same for feeds and is provided with an interlocking device preventing any two feeds being engaged at the same time. The power cross feed and longitudinal feed are friction. The new clamping device which secures the carriage to the bed when facing off work maintains the accuracy of the lathe and no strain is applied to the corners of the carriage. Specifications include a carriage bearing length of 20 in.; belt width of the four-step cone of 2¼ in.; countershaft pulley diameter of 10 in.; and countershaft speed of 250. The maker is the Carroll & Jamieson Machine Tool Co., Batavia, Ohio.

## Thomson's Speed Band Renewer

CHATTERING in the Ford speed bands it is stated, can be overcome with a new preparation known as Thomson's speed band renewer. It is a liquid compound which contains no oils or chemicals that will injure the speed bands or affect the oil in the engine. The liquid is applied to each band after they have been raised off the top of the drum. The solution dissolves the crystallized oil and softens the band to its original pliability. The liquid is sold in 10 oz. cans, retailing for \$1. For service station use, it is put up in gallon containers, selling



*Johnson electric buffer*

for \$8. The manufacturer is the Thomson Auto Specialties Co., Columbus, Ohio.

## Johnson Electric Buffer

THIS buffer is built in a variety of sizes for either two or three-phase alternating current. The most popular size has a 5-hp. motor and operates at 3,600 r.p.m. The long extension shafts make it possible for two men to work on the machine without interference. The shafts are mounted in ball bearings at both ends. The maker is the U. S. Electrical Mfg. Co., Los Angeles, Cal.

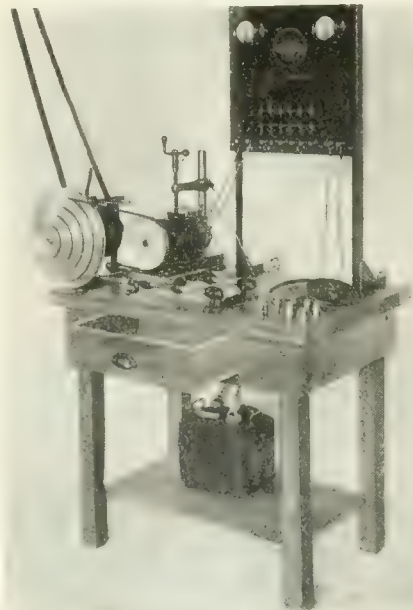
## Miles Waste Washer

ONE of the most expensive items connected with a repairshop is the use of waste and rags. Each mechanic will use several pounds of waste or rags in a week. At the present price, it will pay any service station to clean its oily waste and rags. This can be done by using an attachment such as the Miles washer.

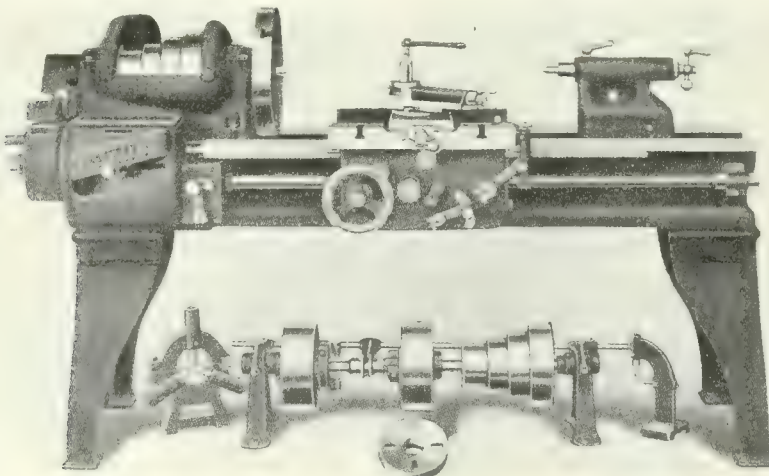
The waste and rags are placed in the washer and gasoline in the tank. The washer is turned slowly 5 or 8 min., and then the waste is wrung out and dried. Good waste and rags may be washed several times. The gasoline is drained out through the plug in the bottom of the tank and after settling may be used again. The price is \$15 and the maker is the Miles Mfg. Co., Newton, Ia.

## Liberty Test Bench

THE necessity of testing generators, starters and magnetos in running is considered the most essential part of overhaul and repair jobs of these particular units. The Liberty test bench



*Liberty test bench*

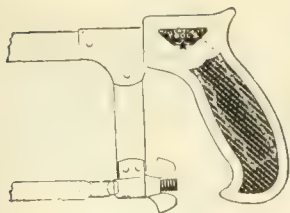


*Carroll & Jamieson 14-in. lathe*

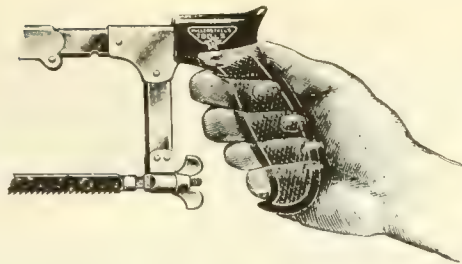


*Miles waste washer*

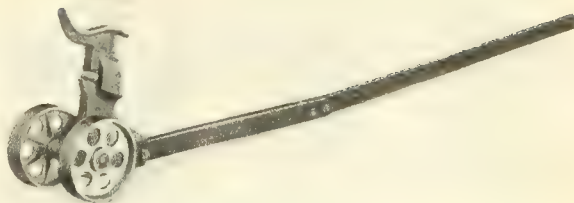




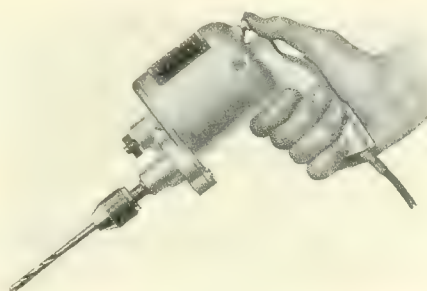
Millers Falls hack saw frame



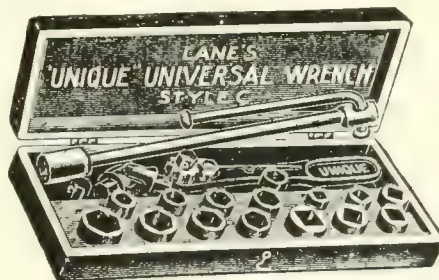
Hovey truck jack



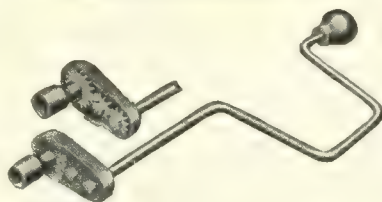
Ford block support



Rhy-Bon drill



Lane's socket wrench set



Dixie offset wrench

with its equipment is designed so that these tests may be made before installing the units on the truck. There is a series of spark gaps on the board to check up on all kinds and sizes of magnetos. Starting motors may be run at the required speed to wear in the bearings and brushes. The test board contains a large volt-meter to indicate the voltage of the generator while charging also an ammeter to indicate how many amperes the generator is charging. These meters are mounted on each side of the board on about a level with the eye, so that they can be easily read and accurate determination made as to the output of the generator. In the center of the board is mounted a B. & S. relay to relay the current from generator to battery. At the bottom is mounted six spark gaps, each containing a terminal to connect a magneto. There are also terminals on the right side for battery connections, and two terminals on the left side for connections to the object to be tested.

The combination variable speed pulley and adjustable vise is a one-piece constructed affair. The pulley is made of solid aluminum and is provided with five different speeds which enable arrangement of the speed from 75 to 3600 r.p.m. This pulley is controlled by a line shaft pulley to which a lever is connected.

The complete outfit sells for \$175. The maker is Paul G. Niehoff & Co., Chicago.

### Pistol-Grip Hack Saw Frame

A COMFORTABLE grip is given with the Millers Falls pistol-grip hack saw frame. The hand does not get cramped when there is much sawing to do. Furthermore, the operator has much more control over the frame and can more effectually restrict any wobble and so lessen the breakage of blades. In the accompanying illustration is shown the steel rib which secures the handle of the frame. It extends through almost its whole length and acts as a backbone to prevent breakage. The blade may be faced in four directions. The frame is extensible from 8 to 12 in. The price per dozen with one 10-in. blade in each frame is \$29. The maker is the Millers Falls Co., Millers Falls, Mass.

### Rhy-Bon One-Hand-Y Drill

BECAUSE of its size and weight, the Rhy-Bon drill may be used to advantage in inaccessible places. Its length is 8 in. and its weight 3 lb. It has a capacity of a 1/4-in. drill and smaller. The grip is in a direct line with

the chuck, giving a straight line pressure on the drill bit. It is designed after the pistol grip and fits the hand perfectly.

Specifications include a Westinghouse motor of the Universal type, 110 volt, A. C. and D. C. Power is controlled by a switch under the thumb. The housing is an aluminum die-casting. The chuck spindle gear is of bronze, driven from a spiral-cut steel pinion, integral with the armature shaft.

Equipment includes 6 ft. of cord with separable plug, and a three-jaw wrench-less chuck. The maker is the Rhy-Bon Electric Co., Chicago.

### Ford Block Support

THIS device consists of a socket, which may be attached to a work bench or other support, and a support arm which fits into it. The support arm is bolted to the engine by the exhaust water pipe bolts. The pin in the end of the support arm is slipped into the crankcase bolt holes and acts as a guide only. The spindle end of the arm is then slipped into its bearing box and bolted to the bench. The price is \$10 and the maker is the Tuthill Sales Co., Kansas City, Mo.

### Hovey Jack

THE No. 3 Hovey jack has been designed so that it can be used under a truck rear axle equipped with a truss rod, without any interference whatever. The handle clears the floor at the extreme end so as to allow the operator plenty of hand room. To raise the truck, the movable head of the jack is kicked up to the desired height, the jack is rolled under the truck and the handle pushed down. The truck is lowered by raising up on the handle. This jack has 6-in. malleable wheels with a 1 1/2-in. face. The handle is 60 in. long. The jack can be adjusted to pick up a load 3 in. from the floor. The list price is \$15. West of the Rocky Mountains the price is \$16.50. The maker is J. H. Whetstone & Co., Lapeer, Mich.

### Dixie Offset Wrench

THE Dixie tool is designed to simplify the job of removing the nuts on the fourth connecting rod on the Ford. The wrench has a gear ratio of 12 to 18 which amounts to a 24-in. leverage. The tool is especially adapted to Ford crankshaft bearing work. The price is \$4 and the maker is the Tuthill Sales Co., Kansas City, Mo.

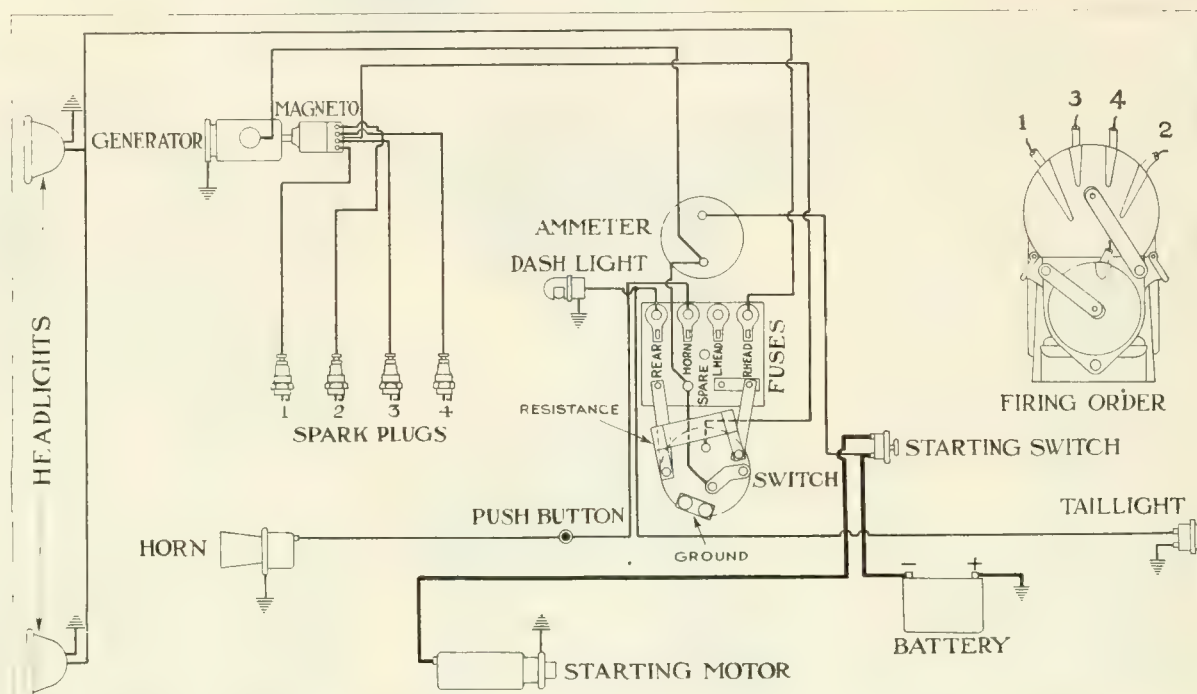
### Lane Socket Wrench Set

LANE'S Style C Socket Wrench Set consists of a ratchet wrench, universal joint, adapter pin, eight machine-made broached steel sockets, with hexagon openings from 7/16 to 1/2 in., and six steel sockets with square openings from 1/4 to 9/16 in. by sixteenths.

This combination is useful in the machine shop, the ratchet wrench, tee handle and flexible wrenches being used for the usual run of hexagon and square screws and nuts that are found on trucks and machinery. The price is \$12. The maker is the Will B. Lane Unique Tool Co., 180 North Dearborn Street, Chicago.

# Motor Truck Electric System Wiring Diagrams

## 19—Starting and Lighting Unit on Stewart Trucks



### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE.

1920

1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting .....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting .....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting .....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15

1921

12—Maxwell, Lighting .....	Jan. 15
13—International, Starting and Lighting.....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 15
17—Geo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Apr. 15
19—Stewart, Starting and Lighting.....	May 1
20—Kelly-Springfield, Starting and Lighting.....	Next Issue
21—Riker, Starting and Lighting .....	Next Issue

If you wish to make the expensive platinum contact points last out their normal mileage, do not overoil the magneto bearings. An excess of oil will spread all over the surrounding surfaces, allowing leakage of the high tension current at many points. This is destructive when present on the platinum contacts of the breaker.

Also, to avoid serious damage, do not run the engine when the battery is disconnected, or with a blown fuse or broken wire in the external circuit, until you have first done at least one of the following things:

- 1—Disconnect the generator at the binding post, or
- 2—Remove one of the commutator brushes, or
- 3—Remove the safety fuse.

The safety fuse is mounted in the cut-out box and protects the generator against being burnt out should it be run at high speed when the battery has been accidentally, or purposely, disconnected from the circuit. Since it is connected into the field circuit, its blowing will render the generator temporarily inoperative before serious damage can occur.

Trouble in the lighting system is usually confined to chafed or broken wires, or to loose connections on the battery, lamps or generator.

Should the ammeter fail to register "charge," first investigate all the fuses, including the one in the generator cut-out box. Next, examine the brushes to see that they are not sticking the brush holders and that they are bearing properly against the commutator.

Inability to keep the battery charged most frequently results from neglect of the battery itself, from too little day driving, from too frequent use of the starter or may be due to an undersized battery.





## Would Use Cushion Tires Instead of Pneumatics

To the Editor, COMMERCIAL VEHICLE:

In one of the spring issues of THE COMMERCIAL VEHICLE you published an interesting letter from the Motor Transit Co., Muskegon, Mich., in which it was shown that by the use of 42 by 2-in. pneumatic tires on a 2-ton truck, average mileage of 8000 for the front and 5000 for the rear were obtained.

Your comment was to the effect that the truck must have been severely overloaded, but the writer of the letter in question stated that the average load was but 4100 lb., or what amounts practically to a negligible overload. The nature of the work performed by this truck may require the use of pneumatics, but for any ordinary hauling the cost would seem to be prohibitive. If we consider only the rear tires, which the writer states average 5000 miles, we find the approximate list cost to be \$605 for the two 42 by 9's with tubes. This gives us a cost per mile for the two rear tires of 12 cents.

Thirty-five by 7-in. cushion tires would have a capacity considerably in excess of the average loads carried by the above trucks. These list at \$126.75 each, or approximately \$254 for the two rear wheels. The mileage can conservatively be assumed at 20,000, which results in a rear tire cost per mile for this type of tire of about 1¼ cents. It would seem that only the most remunerative type of hauling would justify an expense for pneumatics practically ten times greater than the cost per mile of resilient cushion tires.—H. W. SLAUSON, New York.

## Comparing Horse Work with That of Motor Trucks

To the Editor, COMMERCIAL VEHICLE:

With a horse's capacity for work as a standard why cannot a truck do as many horse wagons' work on one route as another? One often hears a truck owner state that his trucks are taking the places of so many horses and wagons on such and such routes, but on others not as many.—J. S., Boston.

While it is true that the work which a horse is capable of doing may be considered as standard, a truck which is the equivalent of a certain number of wagons on one route is by no means the equivalent of the same number on every other conceivable route. This is because the work of both horse and truck is a combination of running and standing.

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

On a route requiring that a great proportion of the time of the vehicle be spent in running, the motor truck will be found equal to a greater number of horse wagons, while on a route requiring a great deal of standing, the horse will be found to loom larger in comparison.

Suppose a wagon is used on a route of a department store which has deliveries aggregating three packages delivered per mile. Suppose that it takes an average of 2 min. per package to de-

liver. If on another route there are five stops per mile at 2 min. each, the horse wagon will make but 16 miles per day, delivering, however, eighty packages. The truck will make only 34.2 miles, delivering 171 packages. In so doing, since  $34.2 \div 16 = 2.14$ , it will take the place of only 2 1/7 horse wagons.

If the time per package is cut in half, the truck will do the work of 3 1/4 horse wagons on the first route and of 2 1/2 on the second.

## Where Does Package Delivery Begin?

To the Editor, COMMERCIAL VEHICLE:

Please tell me where the first cost in package delivery begins. Does it originate from the loading platform, from the wrapping desk or from the delivery department?—READER.

Logically the line of demarcation between delivery and the taking home of packages by the customer himself must be at the point where operations necessary to the delivery of a package differ from those necessary to surrender the package to the customer to be carried home. In ordinary practice, if a package is taken home by the customer, the credit must be checked and all clerical work in connection with the check or bill must be done just as when the package is delivered. The package must also be wrapped and inspected. After the package is wrapped and all of this clerical work is attended to, delivery commences.

The gravity chute or other device used to send the package from the wrapping desk to the shipping room, it therefore follows, is the first step in the delivery of a package. The C. O. D. desk is a part of the delivery department because collect packages are always delivered. The sorting and additional packing that may be necessary in the shipping room are part of delivery, also the routing as to drivers, the loading of wagons or trucks, the operation and maintenance of the trucks and wagons, etc.

Logically the costs of all of these operations should be charged to delivery. In the final records of the concern the overhead in connection with the equipment, depreciation and interest on investment represented, and depreciation and interest on that part of the building occupied by these departments, must also be taken as part of delivery cost, but as this varies greatly with different stores, and often without regard to the efficiency of the actual delivery, such overhead charges should not

## What Do You Think?

If you have not read the Motor Transit Company's letter on page 95 of the March 1 issue, do so, as it gives some valuable information on the use of oversize pneumatic tires.

Mr. Slauson, judging from his letter on this page, has a different viewpoint on the use of pneumatics. He starts an interesting discussion which invites your participation. Let's hear from you.

liver. Then for every mile run the wagon must spend six min. standing. If the wagon can make an average speed of 5 m.p.h., it can travel 1 mile in 20 min. In this mile it will deliver three packages and stand idle 6 min. Thus it can make 1 mile in 26 min. In 8 hrs. on the road it will make 18.4 miles, delivering from fifty-five to fifty-six packages.

A truck might run on the same route, but be capable of a speed of 15 m.p.h. It would then take the truck 4 min. to run a mile. Adding to this 4 min. the same 6 min. of standing time as in the case of the horse, the average time per mile is 10 min. In the same 8 hrs. therefore, it will be able to make 48 miles, delivering 144 packages. As  $48 \div 18.4 = 2.6$ , the truck on this route will take the place of 2 2/3 horse wagons.



be included with a cost statement for comparison with those of other houses.

Delivery costs and truck costs should never be confused. Truck costs are separate and distinct from shipping room or delivery department costs, and include only the fixed and operating costs of the vehicles, the salaries of the drivers and helpers, and garage charges. Delivery costs and truck costs, being for two distinct work operations, should always be kept independently if the true costs in each case are to be determined.

## How to Figure Gear Ratio for Given Truck Speed

To the Editor, COMMERCIAL VEHICLE:

Suppose I have a truck in which there is an engine whose normal running speed to produce good power is 1,000 r.p.m. The speed which this truck makes will naturally depend upon various factors, particularly gear reduction. How can I determine what gear ratio, and other things are necessary to produce, say, 20 m.p.h.?—C. B., Troy, N. Y.

The speed which a truck will make, disregarding slip, depends upon three factors, namely, engine speed, gear reduction and size of wheel. If the engine runs at 1,000 r.p.m. and is capable of taking its full load at this speed, a speed of 20 m.p.h. may be obtained with an arbitrary gear ratio by varying the wheel diameter, or with a fixed wheel size, by changing the gear ratio.

Analyzing the problem, since 20 m.p.h. is 1760 feet per minute— $20 \times 5280 = 105,600 \div 60 = 1760$ —and taking a 3-ft diameter for the wheel, it is seen that such a wheel must revolve 187.5 times per minute to produce 20 m.p.h.— $3 \times 3.1416 = 9.42$  and  $1760 \div 9.42 = 187.5$ . Therefore, to move the vehicle 20 m.p.h., the gear will have to be such as to permit the engine to operate at 1000 r.p.m., while the rear wheels turn 187.5 times, or 1000 to 187.5. Simplified, this is equal to 5.35 to 1, the gear ratio sought.

An easy formula for this process is:

$$\frac{R \pi D}{88 S} = \text{Gear ratio}$$

when R is the engine r.p.m., D is the wheel diameter in feet and S is the speed in m.p.h.

## Magneto Timing on the Waukesha Engine

To the Editor, COMMERCIAL VEHICLE:

Please instruct on how to time magneto on my Waukesha engine.—G. H., New York City.

In case the magneto has been removed from the engine and its connections have not been previously marked it can be re-timed by referring to the marks on the flywheel or by following the procedure given below. The flywheel is marked to show the top dead center for No. 1 cylinder, also the points at which the intake and exhaust valves begin to open and close. The letters DCI mean dead center, IN-O intake opens, IN-C intake closes, EX-O exhaust opens, EX-C exhaust closes. If it is not possible to

observe the marks on the flywheel or they are illegible, proceed as follows:

1—Open the priming cups on No. 2, 3 and 4 cylinders and turn the engine over slowly until the compression stroke begins in No. 1 cylinder. When compression stroke begins in No. 1 cylinder, stop and remove the spark plug; now insert a ruler and slowly turn the engine until the piston comes to upper dead center, or when the ruler ceases its upward movement; the spark should occur at this point with the magneto breaker bar box in fully retarded position. A magneto is retarded when the breaker or interrupter housing arm or lever has been moved to its extreme point in the same direction as the magneto rotates when the engine is in operation. Before setting the magneto as outlined in the following paragraphs, replace the spark plug to prevent obstacles from falling in the cylinder.

2—Remove the two bolts, "A," shown in the accompanying illustration. These connect the two flanges "B" and "C";

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

Make use of it.

The editors will be glad to answer any questions which you ask.

## Answers

now be sure that the magneto has been fastened securely to the base—then connect the coupling "D" next to the magneto.

3—Set the breaker cam in such a position that the distributor arm, "K," will come under the position of No. 1 cylinder high tension terminal in the distributor and so that the contact screws, "H" and "J," are just starting to open. Letter "I" represents the opening between the platinum contacts "H" and "J" with the spark lever in the fully retarded position.

4—Connect up the front coupling with

two bolts. Some place on this coupling will be found two holes almost in line after the magneto has been set as described in number three, but if the holes do not line up in the coupling it is better to turn the magneto back slightly until the two holes do line up, so that the contact points will break a little after dead center rather than before with the spark lever in the fully retarded position.

5—Attach the wire which leads from the spark plug in No. 1 cylinder to the terminal marked No. 1 in the distributor plate; No. 2 spark plug wire to the terminal marked No. 2; No. 3 wire to the terminal marked No. 4; and No. 4 wire to the terminal marked No. 3.

## Road Resistance and What It Means in Truck Costs

To the Editor, COMMERCIAL VEHICLE:

Resistance to tractive effort by road surfaces seems to me to be an item of expense that few of us estimate in our truck operating costs. By that I do not mean that it should be included in the cost sheets but that it should give considerable weight in arguments for better roads. Do you know of any figures that have been published on the subject?—READER

Tests were made some time ago by the Packard company to show the resistance to tractive effort offered by various types of road surfaces. The results showed that unsurfaced concrete offers 30 lb. resistance per ton, surfaced concrete offers 50 lb., gravel 82 lb., and dirt roads 99 lb.

Using a 3-ton truck with a capacity load and a speed of 12 m.p.h. over unsurfaced concrete as standard, the truck will make 7.2 m.p.h. over surfaced concrete, 4.8 m.p.h. over gravel, and 3.6 miles over dirt roads. This makes a relative cost of \$0.167, \$0.194 and \$0.207 per ton mile in the last three cases.

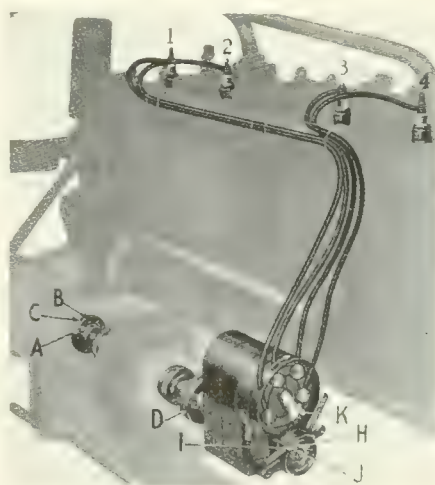
A computation shows that if all roads traveled were gravel as compared with dirt the annual saving in operating America's 400,000 (Packard's estimate at the time of computation) motor trucks would amount to \$70,200,000; if concrete as compared with gravel, \$167,400,000; and if concrete instead of dirt, \$237,600,000.

## Compares the Care and Cost of Horses and Motor Trucks

To the Editor, COMMERCIAL VEHICLE:

Just a few short years ago everybody who had hauling to do used horses. Horses were slow and did not deliver the large quantities of goods that the motor truck of to-day delivers. Horses were a risky investment because they were likely to sicken and die. Horses were filthy upon the streets and within their stables. Horses were sometimes vicious and would kick, bite or run away, causing damage and, many times, death. Horses required great space in which to live, to store their food and to do their work.

With all of these—and many other drawbacks,—how little was thought of the great amount of time that was spent in their care; how few cases there were



Magneto timing on Waukesha engine



where those owning and working them kept a record of the cost of operating. In a few years the motor vehicle has practically displaced this method of transportation, but how vastly different is the attitude of the owners of motor trucks.

Let us make some comparisons between the care and cost of teams and motor trucks.

It would require probably three three-horse teams to do the amount of work that can be done with a 5-ton truck. Nine horses, with at least two "spares," making eleven horses, must have the following attention:

- 1—Fed three times a day.
- 2—Watered three or four times a day.
- 3—Hitched up and unhitched two or three times a day.
- 4—Rubbed and bedded every night.
- 5—Stable cleaned every day.
- 6—Curried every morning.
- 7—Washed and extra attention once a week.
- 8—Taken to the shoeing shop about every 10 days.
- 9—Nine sets harness to clean, oil and repair.
- 10—Mow to be filled with hay, corn and oats to store.
- 11—Three wagons to grease every three to 6 days.
- 12—Upkeep and washing of three wagons.

The above items are things that must be attended to before and after the regular operations of transportation. On Sundays and holidays, or when standing idle, much of this attention must be given, that is, feeding, watering and care.

This preliminary and finishing work in connection with the operating will require:—

- 3 Drivers.
- 3 Helpers in most cases.
- 1 Stable man.

It is not the intention here to make cost comparisons, but rather to show graphically how many large business concerns which were formerly users of horse drawn equipment, were perfectly satisfied with the great amount of attention and non-productive labor attending this system of hauling.

Since the motor truck has practically displaced the horse equipment the parallel of preliminary work together with the operations are about as follows:—

- 1—Space required for storing 5-ton truck with fixtures and supplies is less than one-fifth that of horse equipment.
- 2—Examination of every bolt and exposed bearing on the truck every evening, adjusting and oiling will not consume one-fifth the time required by the men to unhitch and stable the nine horses.
- 3—Washing the truck requires very little more time than washing a wagon.
- 4—Repairs on the one truck will not require more time than repairs to one unit of the horse equipment if truck received the intelligent care required.

Why is it that the truck owner does not require the operator to learn his profession?

Railroads would not trust their loco-

motives to a section hand or a horse driver. They require that the engineer shall know his business and the average engineer receives little more pay than the truck operator.

Why cannot the purchaser of a \$5,000 truck, which must travel rough roads, climb and descend bad hills instead of a smooth level track, realize that it is an intricate piece of machinery, twice as efficient as a railroad locomotive, and must be understood and appreciated?

Why not compel the operator to fit himself for the position and be able to pass an examination before turning over to him this valuable property? Why not have one man put in each day on the truck one-tenth the time required to take care of an equivalent horse equipment?

—E. C. SHUMARD, chief engineer, United States Motor Truck Co., Covington, Ky.

### Horse Wagons vs. Trucks

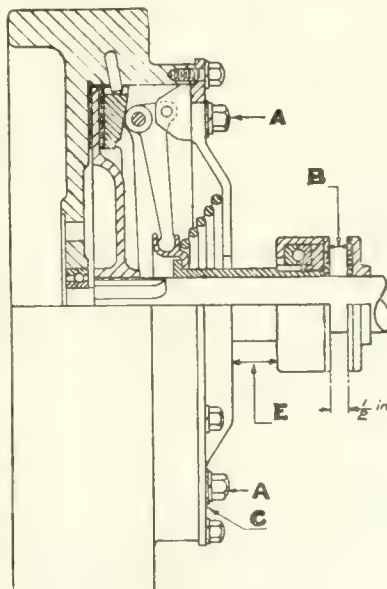
Read E. C. Shumard's letter on the operation of horse wagons and motor trucks. It will no doubt answer many questions in regard to the proper selection of transportation equipment, the handling of trucks, drivers, etc.

### Adjustment and Care of Stewart Clutch

To the Editor, COMMERCIAL VEHICLE:

I am operating a 1-ton Stewart and wish to make adjustments on my clutch. What is the correct method?—Reader.

To tighten the clutch on your model, first release with the foot lever. Loosen the slot-bolts "A" shown in the accompanying illustration, and shift same clockwise, about 1/2 in. Let in the clutch, and, if opening at "B" is less than 1/2 in., throw out again and tap the slot-bolts back anti-clockwise far enough to open space at "B" to a full 1/2 in. The adjustment "A" also adjusts the foot pedal, and when the clutch slips it is usually due to the clutch pedal hanging



Stewart clutch adjustments

up on the inner side of the footboard. When adjusting the clutch see that at least 1/2 in. clearance is left between the pedal and footboard, for wear-in.

The adjustment at "A" must be used to increase or decrease this "B" space. When the clutch is in, if space between these brake faces is less than 1/2 in., the throw-out movement will be too short for clean release.

If bolts "A" adjust against last end of the cover-slots, screw them out of their mounting holes, and set them back into the repeat holes exposed near the first end of the slots, thus doubling the range of adjustment.

If, for any reason, the clutch is to be taken apart, first punch the remounting "line-up" marks on cover and casing, as the clutch will not work properly if cover is shifted in remounting.

In taking the clutch apart, first throw out same and "lock-out" the spring by placing a space block between the cover and throw-out yoke at "E."

Leave the asbestos rings loose in their working seats. Do not fasten to the metal parts. Do not run in oil. If the clutch does not work smoothly take out one adjustment screw and squirt about three spoonfuls of oil into same, just enough to moisten the friction rings. Too much oil will cause the clutch to slip until the oil is burned out.

It will be noted also that there is an adjustment for the clutch pedal lever by means of which the pedal may always be brought to the correct position. As the natural wear of the disks takes place the pedal will move back and up against the under side of the toeboard, and if allowed to touch same will cause the clutch to slip. The pedal should be adjusted to allow for at least clearance. A slipping clutch will rapidly burn the facings, warp the disks and cause other damage which is expensive to repair. The disks themselves require no adjusting but are arranged to automatically take up wear.

### Differential Lock Construction and Uses

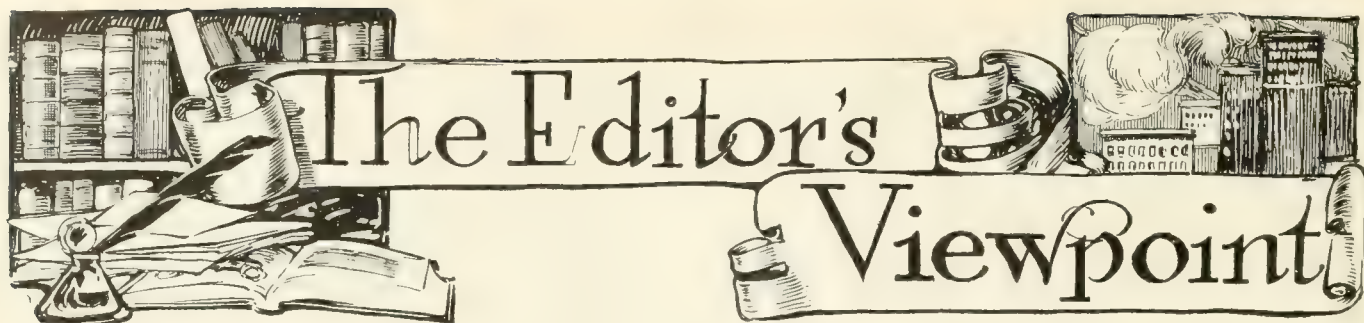
To the Editor, COMMERCIAL VEHICLE:

What is a differential lock and why is it used?—S. G., Tarrytown, N. Y.

It is designed to lock both halves of two-part driving axles or jackshafts and thereby overcome the action of the differential to supply the greatest driving force on the wheel which has the least resistance. The purpose of each is to furnish the same driving force on each wheel so that if a truck becomes so positioned in a mud hole or on a slippery pavement that one of its driving wheels has no resistance or traction, and is therefore receiving all the driving force, the other wheel may be made to take some of it to aid the truck to get in motion without any external aid.

In a differential lock this is done by means of some form of jaw clutch, the male portion of which is mounted on one of the driving shafts and the female portion on the differential casing. This clutch is thrown in and out of mesh by means of a lever in the driver's cab or elsewhere.





## The Right Angle on Truck Road Wear

**T**HAT public recognition and support is being given the motor truck, as an efficient and economical means of transportation, is increasingly apparent.

But those who are in close touch with the development of highway transportation are predicting that the motor truck, even now, is only in its infancy and that still bigger things lie ahead, in the way of public benefits to be derived from motor truck highway transport.

It is possible that chief among these benefits will be the transport economy that will go with an extended use of large capacity vehicles.

At present there is a sporadic but fairly persistent campaign, by means of agitation and adverse legislation and taxation, to run the big motor truck off the roads altogether. This is caused by, and is based upon, the fact that large trucks certainly do more damage than small trucks, truck for truck.

But that is far from a fair way to look at the matter. In fact, a little consideration will show that the use of large trucks causes no more destruction, if as much, than the use of a far greater number of smaller trucks; taking into consideration the amount of material to be shipped and the far greater number of smaller vehicles necessary to transport the same amount of material.

It is only a question of time before those who have hastily judged the large truck as a destroyer of roads will be brought to the realization that there is a definite and ever increasing amount of tonnage that must be shipped by truck and that cannot be diverted to other channels—and that this material can be handled at a lower cost, with less congestion and *with less road wear*, by large trucks.

Of course this does not apply to city traffic, nor to all intercity traffic. There will always be types of deliveries and of haulage which can be best handled by the smaller trucks, either because of the bulk of the material or because of the amount of load available. That is, there will always be a field and a large field for the smaller vehicle.

But taking into account the bulk of intercity haulage—which means the type of traffic which wears the national highways—haulage by large truck is cheaper and more economical of the roads than is haulage by small trucks.

It has been estimated that the approximate cost of motor truck haulage per ton-mile with trucks of various sizes averages about as follows: With a 1½-ton truck, 16 cents per ton-mile; 2-ton truck, 13 cents; 6½-ton truck, 7½ cents. Then it is obvious that this unit cost will be still lower with the 7½-ton capacity truck.

This economy in big units has a direct relation to the cost of commodities bought by the final consumer and so is an important factor in public welfare. If this saving in the cost of intercity transportation were obtained only at the sacrifice of increased costs of road building and maintenance, it would, in all probability, be false economy.

But this is not the case, although it might seem so at first glance.

The reason for this may best be seen by considering what would happen if all the large capacity trucks were taken off the roads. Since the amount of material to be shipped would, presumably, remain the same, it would, of necessity, be transferred to a much larger number of smaller vehicles. This would encourage overloading. And the smaller trucks would travel considerably faster, which would mean more road damage, for it has been proven that road damage increases with speed. Then, too, the amount of dead vehicle weight in proportion to useful load carried would be greatly increased, thereby inflicting an excess amount of unnecessary weight on the roads. Finally, congestion would be greater and the tendency to overload would have its adverse effect upon public safety.

Therefore, it would seem that the present agitation against the larger trucks is based on false premises—more, that the future of highway transportation lies in the extended use and encouragement of large capacity units in the interests of both transportation economy and highway maintenance efficiency.

However this may be, it is up to the fleet owners of the country to make up their minds as to their position on this question. And if they see a future for the big truck, it is up to them to let their legislators know how they stand on the question, so that a stop may be put to the present agitation against the large capacity vehicle, and through it, against trucks in general.



## Advocates Terminals for Trucks

### Ship by Truck Bureau Bulletin Gives Full Details and Advantages

AKRON, April 27—"The Motor Truck Terminal" is the title of a bulletin brought out by the Firestone Ship by Truck Bureau. This bulletin tells how to organize truck terminals, defines the length of the short haul, cites examples of terminal operation, and shows how trucking through terminals adds to the efficiency of motor truck transportation.

Both the public and the commercial hauler gains by the operation of truck terminals, says the bulletin. In addition to expediting the movement of freight, a truck terminal gives the shipper a receipt for his goods from a corporation of unquestioned responsibility, and assures the shipper that cargo insurance will be carried on his merchandise.

"It is not to be expected that the motor trucking industry can attain maximum efficiency while composed of a multitude of individual operators, with resultant large duplication of effort," says the bulletin. "Recognizing this fact," it continues, "many of the most progressive men in the motor trucking industry are interesting themselves in the organization and conduct of motor truck terminals."

Speaking of the advantages of cargo insurance, the bulletin says:

"In the past, in dealing with individual operators, the shipper either has had to take the time to hunt up the more or less rare operators who carry insurance, or take a chance. The fact that many shippers have refused to take either of these alternatives has been a great factor in limiting the tonnage available."

Terminal advantages include a known and accessible place to deliver and receive merchandise, a published tariff, scheduled routes, insurance, responsibility, receipt for goods, increased speed in delivery, improved, and in many instances, cheaper service.

### Truck Economy a Sales Point with Furniture Company

FORT WAYNE, IND., April 20—"The Indiana Furniture Co. of this city owns a fleet of motor trucks, and has found that by using these trucks it has greatly extended the field of its operations. And because of this greatly extended field of operations the company has been able to increase its business and therefore purchase merchandise at lower prices.

All this is a mighty good sales point which the company was quick to realize and make use of in its regular advertisements. Other retailers who own fleets of trucks might utilize the same idea to good advantage in pushing business.

Here is the way the Indiana Furniture Co. presented the proposition in its advertisements:

"Our motor truck delivery system has greatly increased the territory from which this store is enjoying patronage. In the old days of horse drawn vehicles, we were limited in the expansion of this business by a much more restricted territory. Now, however, we are able to do a much greater volume of business by serving a territory several times larger with a resultant saving to us in the cost of our merchandise through larger quantity buying, which saving is reflected in our prices to you. The values we are offering during our sale are worth your traveling miles to see and we will take care of delivery, so no matter what your distance from the store, you can profit by this great sale."

### Vacuum Oil Reduces Prices

NEW YORK CITY, April 20—The Vacuum Oil Co. has announced a substantial reduction in the prices of Gargoyle Mobiloils, effective to-day. The reduction applies to all grades and all size packages. The new prices give its customers the advantage of reductions in the list prices amounting to from \$5 to \$10 per barrel. The reductions for the various grades in lithographed cans are even greater, ranging from 10 to 30 cents per gallon. Gargoyle Mobiloils in steel drums, with faucets, containing 55 to 30 gal., are now supplied at the same price as in wood barrels or half-barrels respectively, without extra charge for the steel drum.

A refund will be made to all such customers of the net difference between the prices at which the oils were originally invoiced and the new reduced prices.

### Ohio Gasoline Down

TOLEDO, April 16—Gasoline is 1 cent cheaper in this city as a result of the cut made by the Standard Oil Co. The retail price is 27 cents.

### Reduces Body Prices

CLEVELAND, April 21—The United Automotive Body Co., this city, has made a reduction in the prices of its Ford truck bodies, ranging from 10 to 25 per cent.

### Penn Motors Corp. Formed

PHILADELPHIA, April 19—H. W. Sofield, former vice-president and general manager of the Keystone Truck Company of this city, has incorporated the Penn Motors Corp. and will build popular size trucks.

### Two New Vulcan Trucks

SEATTLE, WASH., April 23—The Vulcan Mfg. Co., this city, will shortly bring out 1½ and 3½-ton trucks.

### B. & D. Service in New York

NEW YORK CITY, April 19—The Black & Decker Mfg. Co., maker of electric drills and other shop equipment, has established a service station in the Printing Crafts Bldg., Eighth Avenue and 33rd Street, this city. A complete stock of parts will be carried.

## Action Deferred on Parts Service Plan

### Subject Left in Hands of a Joint Committee to Seek Mutual Agreement

DETROIT, April 16.—Following several hours' discussion on April 12 of the national parts servicing plan proposed by unit makers, at end of which it was apparent the contending factions were as far apart as ever, a joint committee of five men representing truck assemblers and five representing parts manufacturers was named to conduct further negotiations looking to the formation of a compromise plan.

General Sales Manager A. J. Whipple, of the Republic Truck Co., brought the discussion to an end with a motion for appointment of the committee "to discuss ways and means for co-operation and to formulate plans looking to our mutual benefit." An amendment authorizes the committee to invite representatives of the National Automobile Dealers' Assn. or others interested to participate if they see fit. The committee will report back to a joint meeting of the Motor Truck Mfrs. Assn. and the parts manufacturers to be called upon notification of the committee that its report is ready.

The committee is composed of M. L. Pulcher, general manager of the Federal Motor Truck Co., chairman, and M. Cook, general manager of the Service Motor Truck Co.; J. W. Stephenson, vice-president of the Indiana Truck Corp.; Col. F. F. Smith, vice-president of the Republic Truck Co.; E. A. Williams, representing the Truck Assn., and L. M. Viles, vice-president of the Buda Co.; William Mack, sales manager of Borg & Beck; Fred Glover, vice-president of the Timken-Detroit Axle Co.; H. L. Horning, general manager of the Waukesha Motor Co., and G. W. Yeoman, vice-president of the Continental Motors Corp., representing the parts manufacturers.

It became apparent at the outset that both sides were determined in their stand, and while there was an evident inclination to get together the point of contact could not be reached. Despite the surface harmony there was always apparent an undercurrent of determination to stand pat, and the result of the meeting is best summed up in the statement of a prominent parts manufacturing executive that "there was lots of discussion and lots of harmony but it doesn't mean anything."

The outstanding feature is that everyone interested is united in a determination to give full consideration to the problem of proper service which means satisfied customers. The matter of price standardization also was a theme for much discussion indicative of growing conviction that a uniform price list must be made effective throughout the country in the near future.



## Illinois to Weed Out Incompetents

### New Ruling Gives Franchise Control to Public Utilities Board

SPRINGFIELD, ILL., April 18—Edward J. Brundage, Attorney-General of Illinois, has handed down an important decision in relation to the rights and authority of the State Board of Public Utilities. It has been claimed that this board had no right to assume control of the hard roads of the State in so far as granting franchises to motor bus and truck companies was concerned. The board insisted that it had such a right and the opinion of the Attorney-General sustains the board.

The point has been raised that the State Board might be legally qualified to pass upon contentions affecting the public and the carrier lines, owned by private corporations, but the question of controlling the hard roads, built by the Government, State, county, township, cities and private subscription, was a different matter. The highways, it has been maintained, were built by the public and for the free use of the public, and this permits anyone to operate over them, whether for gain or otherwise. The Attorney-General now holds that this point of unrestricted use of the highways for gain is not legal and that this must be held within proper bounds.

In other words, the State Board has the authority to limit the use of the highways to such companies as are properly officered, financed, serviced and operated, and all others may be barred at the discretion of the State Board and which may withhold a certificate of convenience and necessity.

Orders issued by the commission in governing the rights of the public corporations, etc., may only be set aside when found to be in clear violation of a rule of law or against similar weight of evidence. The decision was sought following the attempt to restrict motor bus and truck service to certain companies on the new concrete highway between Peoria and Springfield. A score of bus and truck owners are planning to handle passenger, express and freight service. With the business cut up, there will be profit for none and service to the public will be irregular and unsatisfactory. The State Board must determine which companies may operate and then see that they serve the public properly and without unreasonable charges and with adequate insurance.

### Oppose Pennsylvania Gas Tax

HARRISBURG, PA., April 16—"Ship-by-Truck" forces are up in arms against the proposed tax on gasoline to speed up the State's revenues. Protests against the measure are pouring in and in various sections of the State advertisements are being printed in the newspapers calling on truck owners to protest to

their legislators. It is said that this tax would greatly increase delivery costs at a time when normal conditions are the goal of business.

The administration bill imposing a State tax of 1 cent a gallon on gasoline sold in the commonwealth, except for purpose of resale, has been reported from the Committee on Ways and Means of the House. All taxes are to be paid into the general fund of the State treasury.

### Wilmington Freight Service

WILMINGTON, DEL., April 21 — The first local motor bus freight service has been inaugurated by the People's Bus Line, which for some time has been operating a passenger service between Wilmington, Elsmere, Marshallton, Hockessin and Yorklyn. There have been long haul freight deliveries for some time, but this is the first local service to be operated on a regular schedule. Other routes are to follow the lead of this one.

### New Goodyear Solid Truck Tire

AKRON, April 18—Development of a new solid motor truck tire with "All-weather" or non-skid tread, similar to that used on pneumatic automobile and truck tires, is announced by the Goodyear Tire & Rubber Co.

The adoption of the All-weather, diamond block design of Goodyear passenger car tire, as a tread principle for the new solid tire, will afford more positive traction for heavy and slower moving trucks, and will increase the field of usefulness of solid truck tires, it is announced.

The side walls of the new tire are built on an angle to prevent undercutting of the tread. Tests conducted by Goodyear with the new tire have demonstrated that it can be used on roads and under conditions which have formerly been barred to the easily mired heavy truck on solid rubber tires. The additional height afforded by the new tread provides an oversize factor for cushioning both the truck and the load as well as taking much of the bump and jar out of the truck driver's daily job.

### Maccar to Enlarge

SCRANTON, PA., April 26—The Maccar Truck Co., this city, is planning large building additions to its plant.

## Coming Events

1921

- May 17-19 Buffalo, N. Y., Spring Meeting of Service Managers of National Automobile Chamber of Commerce, Iroquois Hotel.
- June 13-16, Detroit, Mich., Annual Convention of National Team and Motor Truck Owners, Inc., held aboard ship during cruise on Steamship Naronic.
- June 15.... Philadelphia, Pa., Annual Outing of the Motor Truck Ass'n of Philadelphia, Lu Lu Country Club.
- June 23-25, Milwaukee, Convention National Association of Commercial Haulers.
- Sept. 28-30, New York City, Electrical Show, 71st Regiment Armory.
- Sept. 2 weeks, Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.

## Fight Michigan Tax on Earnings

### Hits Fleet Owners Competing With Railroads and Non-Truck Owning Concerns

DETROIT, April 18—Truck manufacturers are making a bitter fight on Representative Strauch's bill proposing a 5 per cent tax on the gross earnings of motor trucks and motor buses operated for hire. Efforts of the manufacturers and dealers have been enlisted by truck owners who declare it is purely a railroad measure aimed at the elimination of motor truck competition and is a distinct blow to the efforts for cheaper transportation.

It is contended passage of the bill by the Michigan Legislature not only would increase the haulage cost to the consumer, but would be grossly unfair to the manufacturer, packer or small industry which cannot afford to own its own motor trucks. These concerns would be subject to the tax while the big concerns which own their own trucks would escape.

The Detroit Transportation Assn. is leading the fight on the bill and a deputation from that organization went to Lansing to protest against the passage of the measure.

### Winther Truck Consolidation

KENOSHA, WIS., April 16—Consolidation of the Winther Motor Truck Co., the Kenosha Wheel & Axle Co. and the Marwin Truck Corp. will be announced April 29 if the stockholders ratify the action proposed by the directors and they are expected to give their assent.

There is a strong probability that this combination will be expanded later by the addition of a half dozen representative truck manufacturing companies. Under the plan proposed each factory would manufacture a truck of one capacity.

### To Stop Reimportation Evil

WASHINGTON, April 18. — No anti-dumping bill will be allowed to pass in the Senate without a specific provision covering reimportation of army trucks and other surplus war supplies sold abroad.

This statement was made today by Senator Smoot in an interview given the correspondent of THE COMMERCIAL VEHICLE. The anti-dumping measure which Representative Young of North Dakota introduced in the House did not carry this proviso.

Senator Smoot feels that the anti-dumping measure is for the protection of domestic markets from foreign competition and that it must embrace all phases of the problem. He is prepared to draft an amendment to the Young bill if it passes the House without the provision essential to the protection of American motor vehicle manufacturers and dealers.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. C. Building  
239 West 39th Street, New York

## CONTENTS

Vol. XXIV, No. 8

May 15, 1921

### LEADING ARTICLES

"We Saved One Truck in Five!" .....	237
Shipper to Consignee—Without Handling! .....	242

### MISCELLANEOUS ARTICLES

Who Shall Do My Buying? .....	240
Do Your Drivers Watch the Brakes? .....	243
Nine Pictures—Six Useful Ideas .....	244
You Don't Have to Do It, But— .....	249
The Right Way to Charge Interest .....	250

### DEPARTMENTS

The Engine on Your Packard Trucks .....	247
The Better Way .....	252
Buyer's Department .....	255-261
New Bodies .....	255
New 5-Ton Federal Truck .....	256
Truck Accessories .....	258
New Shop Equipment .....	260
Motor Truck Electric System Wiring Diagrams .....	262
The Fleet Owners' Forum .....	263
Editorial: We Want Truck Terminals! .....	266

### NEWS

Annul Nebraska Truck Haulage Rates .....	267
Rhode Island Adopts New Tax Method .....	267
Store Door Delivery for Baltimore .....	268
Standard to Produce Steam Trucks .....	268
Index to Advertisers .....	70-71

## The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT

David Beecroft, Directing Editor  
Ray W. Sherman, Executive Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879.

### BRANCH OFFICES

Chicago, Mallery Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536 540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account .....	50c
of Zone Postage Law .....	\$3.00 per year
Canada .....	\$4.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

# QUALITY



# N O R M A

# PRECISION BEARINGS



# All The Driver Does Is Drive!



## Lapeer Trailers!

American Railway Express	for Philadelphia
Barrett Company	" Chicago
Columbia Terminals Co.	" St. Louis
Dominion Express Co.	" Montreal
Heavy Haulage Company	" Detroit
Morgan Ash & Co. Co.	" "

Names to conjure with! Leaders in their lines! And all of them purchased fleets of Lapeers during April!

Our literature (mailed on request) tells why.

M. E. Ryan (Sole Distributor)  
2807 So. Michigan Ave.,  
Chicago, Illinois.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Vol. XXIV May 15, 1921 No. 8

## "We Saved One Truck in Five!"

**"It Cost Over \$30,000 to Install Our Demountable Body Equipment, But—Well—Figure It Out!!"**

"HOW did I come to the decision to install demountable bodies on our trucks? Why, the trucks were idle at the loading platform from an hour to an hour and a half. Trucks are rolling stock. And rolling stock should be rolling—not stationary. There was something wrong—so we fixed it.

"Installing this demountable body equipment cost us over \$20,000. But it saves us a truck in every five—now, figure it out for yourself!"

These are the words of F. A. Reif, general manager of the Ludwig Baumann furniture and department store, New York City, which owns and operates 22 trucks of slightly different capacities, but all of them equipped with standardized, interchangeable, demountable bodies.

Fully to understand the reasons for the installation of this equipment and the remarkable benefits from it, it is necessary to go back a little.

Originally the trucks were equipped with fixed bodies. The furniture and other goods were brought up to the loading platform on hand trucks.

The morning scene at the loading platform was a busy one in those days. There would be men swarming in all directions, pushing hand trucks here, leading trucks there and maneuvering this and that truck into position so that it could be loaded. And for hours together, sometimes,

this loading continued, as one truck after another pulled into place for its load, because it took from an hour to an hour and a half to load a truck by this method—and only a few trucks could be loaded at the same time.

### What This System Cost

Alterations to Buildings, alterations to the chassis, installation of the elevator and the bodies cost about \$22,000.

But the system saves the time of about one truck in five. And taking the yearly cost of a truck as \$2000, a very moderate estimate, saving one truck in five means saving at least four trucks in 22. This means that the system at least:—

### Saves \$8000 Each Year

Then one day Mr. Reif stood watching this scene for a while. And he came to the sudden conclusion that it was all wrong. Rolling stock—valuable rolling stock like motor trucks—should be kept rolling, not allowed to stand idle for an hour or two every day. Therefore, something had to be done about it.

So Reif went into consultation with the vice-president of the company. And after a time they decided upon installing demountable bodies. But they did more than this. They evolved between them the system that now loads every truck in the department in less than ten minutes—and that by careful routing keeps no truck waiting more than twenty min-

utes—from the time it reaches the loading place to the time it starts out on the route for the day.

The big change which the new system involved was the substitution of thirty-six demountable bodies for the twenty-two fixed bodies with which the trucks had been equipped. But while they were at it, the two originators of the plan made up their minds that the bodies should be as efficient and should combine as many labor, time and money saving devices as human ingenuity could devise.

Moreover, the new system required that the delivery department should be altered to fit the new system and while they were at it, the originators of the plan also decided that these alterations should allow for every possible advantage.

They succeeded. For the bodies have proved ideal in every way and the building alterations permit the new system to go like clockwork.

The elevator is the key to the system. It is a 2¼-ton elevator, running from the store basement up to the ground floor (one flight) and capable of rising four feet higher than the floor level of the ground floor.

Thus when a truck comes in at night with its demountable body, the elevator is raised from the ground floor level to the level of the truck tailgate. The demountable body is rolled off the truck onto the elevator and the elevator lowers it to the basement where it is loaded.

In the same way, when the body is loaded, the elevator raises it again to the ground floor level, where it is either loaded directly onto the truck chassis again or rolled out onto the ground floor to await its turn to be run onto its truck.

The loaded bodies are arranged on the ground floor in the order in which they

# SAVING ONE TRUCK IN FIVE!

are to be loaded. They are run, one by one, onto the elevator and as each truck comes in in turn, the elevator raises the loaded body to the tailgate level again and the body is run onto the chassis and clamped in place. The whole process takes less than ten minutes!

Thus the elevator is a vital factor in the entire system. But it is so designed as to simplify all its functions as much as possible. For example, while it is built up against one main wall of the building, the other three sides of it are clear on both floors. And on both floors and on the elevator itself there are gates which can be opened on all three open sides of it. Thus, bodies can be rolled off or on the elevator from any one of three directions. This is a great convenience, when working with a number of bodies.

## Design of the Bodies

The bodies themselves are very skillfully designed. In the first place they are built to specifications furnished by the company and they are all exactly alike, not only in dimensions but also in equipment, such as the doorways at the sides, the curtains and curtain equipment and the rollers on the bottom.

The bodies are all 10 ft. by 6 ft. by 6 ft. The curtains are standardized and interchangeable throughout the entire fleet and the truck chassis tracks are also standardized and interchangeable throughout the entire fleet, so that any part of any body can be applied to any other body and any body can be fitted onto any truck.

But the most valuable and most original feature of the body design is the

construction of the under part and the type and application of the rollers.

The bodies are equipped with twelve rollers each. Six of these rollers are heavy 6 in. wheels, three on a side, in perfect alignment and fixed. The other six rollers are also three on a side, but are very much smaller than the others, extend about 2 in. lower than the others and are swiveled. They are also in alignment.

## One Flaw in System

Thus it will be seen at once, that when the body is resting on the floor in the basement, it rests on the six smaller swivel wheels as these extend lower than the others. And this means that these bodies can be pushed or pulled about the floor with one hand without difficulty and in any direction.

The great advantage of this quality will at once be apparent. For the loading space in the basement is long and narrow, as one of the illustrations shows, and if the bodies could only be rolled forward or back, they would have to be rolled into place in regular order down on the loading floor and then rolled out again in exactly the reverse order. In other words, they could not be maneuvered one around another and would be under the same disadvantage that the street car is under in comparison with the motor bus.

As it is, any body can be placed in any position on the loading floor and can be pulled sideways out of its place in the line and run onto the elevator, when it is wanted.

The one flaw in the system, if it can be called a flaw, is the fact that with

no loading platform and with only one elevator, only one truck can be loaded at a time. This means that, in spite of the speed with which the loaded bodies can be run onto the truck chassis under the new system, there is still a certain amount of idle time for the other trucks while the first trucks are having their bodies put on.

This does not mean the loss of very much time—far less, in fact, than was wasted under the old system—but wasted time is wasted time, however little of it there may be—so the general manager is not yet entirely satisfied with the system.

Nevertheless, there are methods which obviate this difficulty to a considerable extent and these methods are carefully employed. In the first place, the trucks which are destined for the longest runs are naturally loaded first in the morning. This means that the bodies which are to go onto those trucks are assembled and arranged on the ground floor in positions nearest to the elevator, so that they can be run onto the elevator first and thence loaded onto the trucks without maneuvering them around the other waiting bodies.

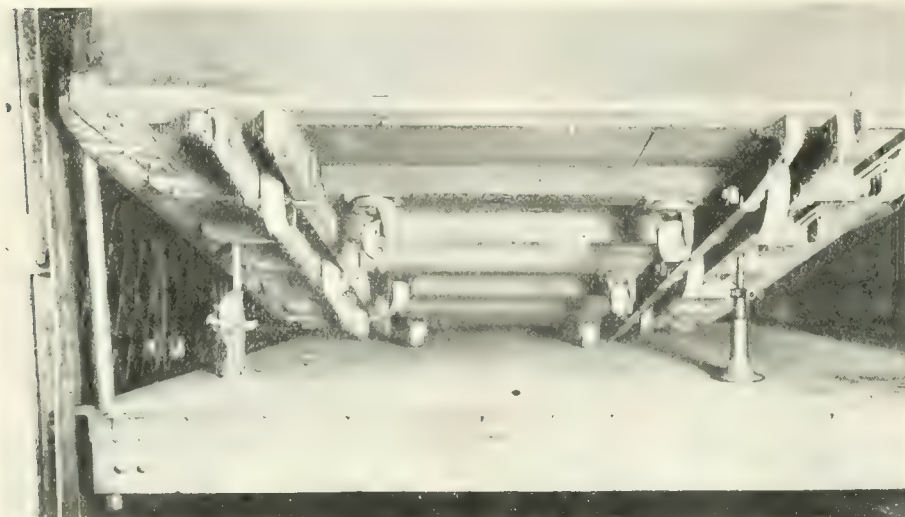
Naturally, then, the bodies which are to be loaded last are furthest from the elevator. And the trucks which are to be loaded last take up the more remote positions in the street outside.

## How Routing Helps Out

But in order to save the idle time of the trucks which are to be loaded last, a careful routing system has been installed. This is worked out as follows: In the evening when the trucks return to the garage, the work for the next day is already known. This work is carefully laid out and divided up into long, fully loaded runs; shorter, fully loaded runs, and deliveries and calls at points and with goods which, because of the quantity involved or the location of the stop, would not justify a stop by some truck with a full load otherwise.

But these last stops have to be attended to anyway. To send a partially loaded truck on a run with only a few pieces of furniture for one delivery and to return empty would be poor economy under ordinary conditions. And the same applies if the truck starts on the run empty and picks up only a few pieces of furniture, etc.

But it is just these partly loaded trips and calls which help out on the idle time. For if a load is to be picked up from the warehouse, or if a delivery is to be made somewhere in the vicinity of the garage but off the route of any regular truck—or if a delivery is to be made on a route where the truck on that route already has a full load—these deliveries are made by the trucks which are to receive their loaded bodies last.



*This view of the under part of one of the Ludwig Baumann demountable bodies shows the arrangement of the two sets of six rollers. Note that the inner set, which comes into play when the body is on the loading floor, are swivel and are lower than the others. The other six wheels are fixed and come into play on the truck chassis track*



In order to do this, the empty body is not removed from the truck the night before. Instead, the truck goes to the garage with its empty body still in place.

Then in the morning, the driver of that truck and his helper are instructed to apply to the loading basement and carry the small load up and load it into the waiting truck by hand—work which is comparatively simple and quick, owing to the smallness of the load. Or if there is a load to be picked up from a warehouse, the driver is instructed to call at the warehouse for that load, while waiting for his regular daily load. Thus these last trucks to be loaded are not entirely idle while waiting for their loads.

Then, when the trucks return from these short trips, the bodies which they carry are run onto the elevator and so down to the loading basement, while the body which contains the regular day's load replaces the other on the chassis. And by this time the first trucks to be loaded have already gone, so there is no further delay in taking on the regular load for the day.

### Elevator Advantages

One important advantage of the elevator is the fact that it takes care of the rise in the chassis as the weight of the loaded body is transferred from the rear springs of the truck to the elevator. Thus, in unloading a body, the elevator is at the chassis track level until two wheels of the body are on the elevator. The elevator is then raised slightly, to allow for the spring expansion. When the next two wheels have been transferred to the elevator, the latter is still further raised a trifle, so that the last pair of swivel wheels slide smoothly onto the elevator, for it must be remembered that these swivel wheels are lower than the fixed, track wheels. Care is necessary that the swivel wheels do not strike the edge of the elevator.

The loading process is just the reverse of this. Thus in loading a body onto a chassis, the elevator is at the chassis track level until two wheels of the body have been run onto the chassis track. The elevator is then lowered slightly as the truck springs compress and the second pair of fixed wheels slide onto the track. In this work, the swivel wheels on which the body rests while on the elevator make it comparatively simple to line up the other four fixed, track wheels opposite the chassis track. The other four wheels then slide gently into place on the chassis. This is of great importance. For if the back of the body crashed down into place on the chassis, owing to the lowering of the latter by the compression of the springs, the resulting strain on the springs would soon result in a broken spring leaf, followed by all sorts of difficulties.

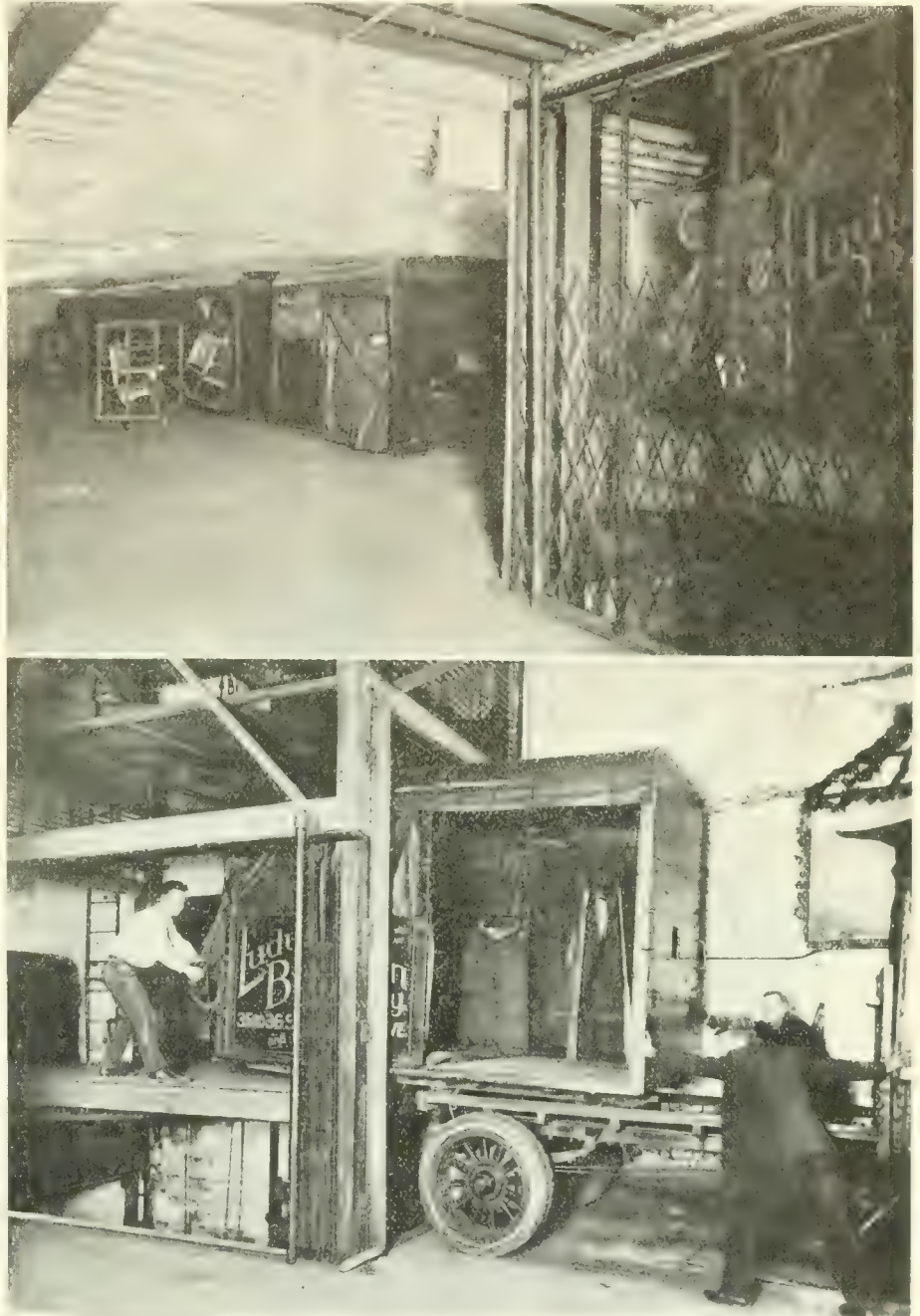
### Advantage in Overhaul

Finally, the demountable bodies save time in other ways also. For the trucks are inspected once a month and are thoroughly overhauled at least once a year. And it must be remembered that

this inspection and overhaul involves either the removal of the truck body or work under difficulties in the case of the inspection which will probably mean that the work is not done thoroughly. (In the case of overhaul, of course, the body must be removed anyway. And

countable bodies. The alterations to the building, the alterations on the chassis, the installation of the elevator and the bodies themselves cost about \$22,000.

But the system saves time approximating the work of at least one truck in five. And taking the total yearly cost



Two views of the Ludwig Baumann demountable body system. Top view—Part of the long, narrow loading space in the basement of the building, showing a corner of the elevator with a loaded body on the right and some of the demountable bodies in process of loading on the left. Lower view—Rolling one of the bodies from the chassis onto the elevator. Note the open side of the elevator, which simplifies loading the full bodies onto it and thence onto the trucks

this takes a good deal of time when the bodies are fixed).

But with demountable bodies, the body need only be rolled off onto the elevator and transferred to the basement and the chassis is ready for inspection.

The company operates twenty-two trucks. In all there are thirty-six de-

of a truck at \$2,000, a very moderate estimate, saving one truck in five means saving at least four trucks in twenty-two, or \$8,000 a year. Thus the entire system will pay for itself in less than three years and after that the cost of the delivery system will be greatly reduced.



# Who Shall Do My Buying?

**It Costs Money to Save Money!—And the Time and Money Spent on the Organization for Buying Tools and Accessories Should Depend Upon the Size of the Fleet**

**T**HERE can be no question about the importance of *system* in handling any branch of motor truck operation or maintenance. If there is a definite system, there is a place for everything, a definite person responsible for everything and a definite method of ascertaining conditions at any stage or time.

This applies equally to the buying of supplies for a fleet: the purchase of tools, machine tools, accessories, parts and the trucks themselves.

But although system is necessary, a certain distinction must be drawn between the system best adapted to the purchase of these supplies for a small fleet and the system best adapted to their purchase for a large fleet.

System is an excellent thing, but it costs money both to organize and to maintain. Therefore, the extensiveness and the inflexibility of the purchasing system must always depend upon the size of the fleet maintained. For there comes a point, in the organization of a system, where the cost of the system exceeds the benefit derived from it, and before that point is reached the extension of the system should cease.

## For the Large Fleet

Suppose the United States Highway Co. owns and operates 600 trucks. The purchase of supplies for these trucks—tools, spare parts, tires and accessories,—will mount into tens of thousands of dollars in the course of a year. Therefore, the system of purchasing these supplies will either save or cost the company thousands of dollars yearly, according to whether the system is a good one or a poor one. For a few cents saved on the cost of a tire, for example, will reach a very respectable figure when it is multiplied by four for the truck and by 600 for the fleet.

Therefore, it will be to the advantage of the United States Highway Co. to organize a thoroughly efficient purchasing system and probably to hire and install a thoroughly efficient and highly paid purchasing agent to look after the purchasing of all such supplies and nothing else. For the saving in the cost of supplies to the company of buying through such an agent will more than pay for the agent's salary, etc.

## But for a Smaller Fleet—

But the cost of maintaining such a purchasing agent for a smaller fleet would be far out of proportion to the

amount of money which he could save by efficient purchasing methods. For the entire cost of supplies, aside from the trucks themselves, would only be a few thousand dollars, for a fleet of 15 trucks, for example, and even the most efficient buying could only save a few hundred dollars on such an amount. But the purchasing agent's salary will be at least \$3,000 yearly.

Therefore, the owner of the smaller fleet will have to work out some efficient buying system which will keep his buying costs down to a minimum, but which,



*E. J. Petersen, traffic superintendent for Richard E. Thibaut, Inc., who handles the buying of all tools, parts and accessories for the Thibaut fleet*

at the same time can be operated by the personnel already available. In other words, the work of purchasing will have to be in the hands of one or more members of the organization who have other duties also.

Then the question arises in the mind of the small fleet owner: "Who is the logical member of my staff to handle this purchasing?"

This is the question which the general manager of Richard E. Thibaut, Inc., Wall Paper, had to solve. And this story tells of the satisfactory method in which he solved it, without increasing his overhead expenses.

The Thibaut truck fleet consists at present of fifteen Autocars, five Fords,

of which two are delivery vehicles and three are salesmen's runabouts, and a Reo Speed Wagon. In addition to the trucks, the company still operates a number of horse-drawn vehicles for short haul work.

The entire fleet of trucks and wagons is under the direct control of E. J. Petersen, the traffic superintendent. Therefore, it was decided to place the entire responsibility for purchases made for either the truck equipment or the horse-drawn equipment upon the shoulders of the traffic superintendent.

Thus, so far as tools, equipment and accessories for the trucks are concerned, the final decision rests with the traffic superintendent. But the system is a flexible one, because Petersen never purchases supplies for the trucks without first consulting his garage superintendent, Peter G. Linn. Mr. Linn is an old hand and is not only in touch with what is needed for the fleet, but he is thoroughly in touch with the market and in a position to advise not only as to what should be bought but as to where to buy it.

## Checking Up on Supplies

Thus, while the responsibility is on the shoulders of one man, the actual detail of purchasing is spread to two men, which is an advantage, not only in two heads being better than one, but also because it does not take too much of the time of either from other duties.

The question of ascertaining when supplies should be bought and insuring the necessity for such purchase is decided by Mr. Linn. For this purpose a check up of stock in hand is not really essential, because the garage superintendent is constantly in touch with the repair work and knows off-hand what supplies are in hand and which stock is running low. But in order to insure that nothing shall be missing when it is needed, the entire stock is gone over about once every six months and carefully checked up.

It will be noted at once that the company has not installed a card index system for checking supplies. In some ways this would have been a good thing. But it was decided that the card index system would take more time than it would be worth, because Mr. Linn was so closely in touch with the stock anyway, so the system was not installed.

Now, the garage superintendent simply reports any shortage of spare parts to Mr. Petersen. Then after a few of these notes have collected, but while



there is still some stock to go on with, the traffic superintendent collects these notes and makes purchases on the various stocks at one time, thus handling a number of details at one time.

The parts, tools and equipment stock carried is not a large one, amounting as it does to a total value of about \$5,000.

How Buying Is Done

The purchase of tools and small supplies usually follows these lines. If the equipment to be bought involves the expenditure of a good deal of money, the traffic superintendent consults with the garage superintendent as to the best places to make the purchases. He then telephones to three or four such places and gets a quotation from each. The purchases are then made according to the best quotation.

Sometimes, when a number of purchases are to be made, a salesman calls and makes a bid on the entire lot. But as a rule the different dealers usually make about the same price to a purchaser with whom they have already had dealings and whom they know as a fleet owner.

These goods are bought direct from the manufacturers who do not charge the company the list price of the article, but a lower price than the dealer could make, because the truck owner also buys in quantity. As a rule the company gets a regular discount on all such goods for cash.

Buying of Spare Parts

The buying of spare parts is simple. All spares are bought direct from the manufacturer and not through a dealer.

The number and price is taken from the manufacturers' catalog and an order made out accordingly.

On the purchase of accessories, the company has a visiting salesman who calls once a week and from whom small accessories are bought. The price is a little higher by this method than would

pany would buy on the open market, getting quotations first.

Mr. Petersen checks prices more or less from experience. Long purchasing has taught him about what prices should be. But in addition, he is always notified of contemplated advance in prices by the salesman of accessories, the manufacturer of parts or of tires, so that he can buy in before the rise if he wants to. This has often saved a considerable amount of money, though more on the purchase of tires than of accessories.

The Purchase of Trucks

When it is necessary to purchase another truck, however, the final decision is in the hands of the general manager. The traffic superintendent consults with the garage superintendent, both as to the necessity for buying a new truck and as to the truck to be bought. The matter is then put up to the general manager, who has the final decision. But the actual purchasing is done by the traffic superintendent. The general manager also takes the final decision on the purchase of machine tools, but he is not consulted on the purchase of the less valuable supplies.

When new trucks are purchased, the old truck, if one is to be discarded, is traded in to the dealer. The price allowed varies with the age of the old truck, but usually varies from \$400 to \$1,000 for an Autocar and from \$75 to \$200 for a Ford.

Thus the system is sufficiently flexible to profit by the experience of three members of the organization, without taking too much of the time of any one of them.



This Fleet Owner Buys:—

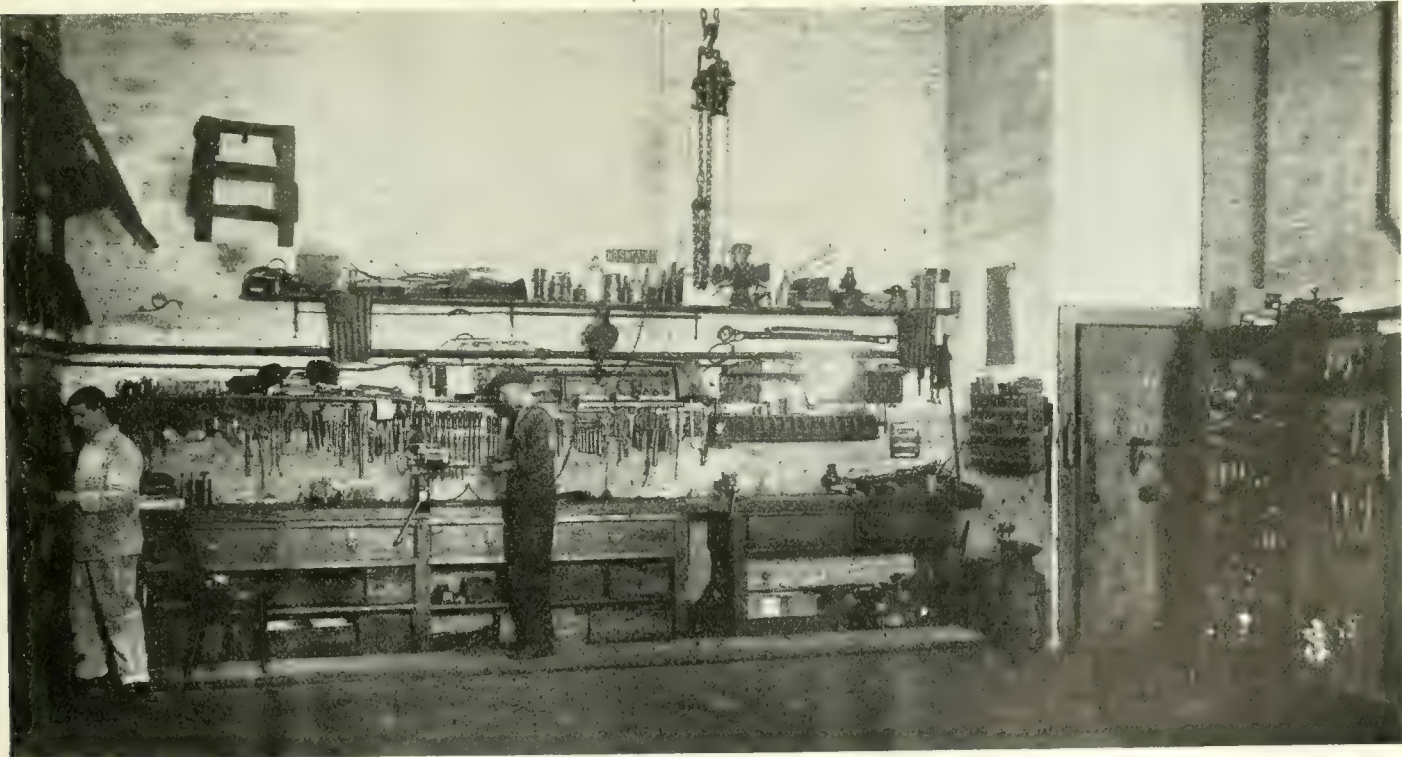
- 1—Truck parts direct from the manufacturers. The traffic superintendent has charge of this.
- 2—Accessories from a travelling salesman. The garage superintendent has charge of this.
- 3—Tires from the manufacturers. This is handled by the traffic superintendent.
- 4—Tools and equipment from dealers. The garage superintendent has this in hand.
- 5—Trucks themselves from dealers. The general manager has the final decision here.

The System Saves Money!



be the case if the goods were bought on the open market and quotations obtained from various places, but the time saved by buying through a salesman more than makes up for the slightly higher price. For the salesman will always insure the prompt delivery of any accessory called for, whether he has it in stock or not.

However, if the fleet were larger and more accessories were needed, the com-



The repair bench at the rear of the Thibaut garage, showing the orderly layout of the tool equipment. Some of the spare parts can be seen on their shelves on the extreme right. It is a simple matter to check tools and parts kept in such order. The garage superintendent, Peter G. Linn, can be seen at the extreme left



# Shipper to Consignee—Without Handling!

*An Experiment in Railroad and Motor Truck Co-operation with the Unit-Container That May Reduce Transportation Costs to a Minimum and Revolutionize Present Methods*

**T**HE first results are just forthcoming of an experiment whose recent announcement stirred the transportation world to a high pitch of interest—the experiment in the supplementing of railroad by motor truck, carried on by the New York Central Railroad between Chicago and Cleveland in connection with the Motor Terminals Co. Its aim was nothing less than the most perfect unification and co-ordination of the phases of transportation involving the conveyance of freight from door of shipper to door of consignee through the use of motor truck in the short haul. The novel element in the undertaking was not only the regulation co-operation of motor truck and railroad but also the “unit-container,” by which so many handlings and rehandlings are eliminated.

The container is a steel box, packed and locked at the factory of the shipper, carried by motor truck or electric car to the railroad and hoisted aboard a specially designed car, and at destination conveyed by truck to the store door of the consignee, there to be unlocked and unloaded at convenience.

## Results of Experiments

The results of the first two trips of the car have fully justified the conception of the invention as a most significant development in transportation evolution. The first car left Chicago on March 19, with a shipment of groceries from the large wholesale grocers of Chicago, the Reid Murdoch Co., the destination of the whole cargo being the Cleveland representative of this firm.

Every movement of the freight was analyzed as to duration, and the analysis brought out the most striking saving over methods of ordinary transportation convention. This economy is summarized in the second day delivery effected, almost never achieved in the employment of old railroad procedure.

The first movement, the placing of one of the large empty containers on the waiting motor-truck, was accomplished in eight minutes from the time the rigging of the crane to the container was started.

The trip was then made to the shipping dock of the Reid Murdoch Co. Here the loading of 198 pieces into the container was made in about 33 minutes, each piece being first checked by an agent of the railroad who accompanied

the truck. After a return journey to the car side the loaded container was rigged, hoisted, and placed on the car, and the time consumed in the removal of container from truck to freight car was five and one-half minutes.

There are two containers to a freight car. The second container was removed to the waiting truck in only three and one-half minutes, the gain of the second container over the first in the corresponding movements being due to the

## What This Plan Means!

Motor trucks are a vital factor in our country's transportation.

It only remains to improve motor truck transportation as all the other methods of transportation have been improved.

The unit-container and railroad and truck co-operation plan is a big step in the right direction.

It means quicker, safer, cheaper deliveries.

It means the elimination of congestion at freight depots and at loading platforms.

It means reduced labor.

## Let's Work for It!

fact that crane and rigging had already been adjusted to within a few feet of the second container by the conclusion of the first operation. Replacing of the same container into the car after loading of the container took up six minutes.

## Time Saved in Unloading

The container car arrived at Cleveland at the New York Central's crane track on Wasson Street on March 20. Unloading of the first container to the motor-truck took seven and one-half minutes and replacing after return from consignee's plant consumed six minutes. Only two and one half minutes was required to remove the second container, this saving being again due to the original proximity of crane to the container. Every article shipped was received in first-class condition and in its original position;

nothing, furthermore, had been crated.

The time records just quoted are indeed startling, but they will even be improved as the system becomes more general and the crane operators become more used to handling the containers.

The second trip of the container car started on March 22, the train making the return trip from Cleveland to Chicago. The three shipments were from three Cleveland firms of national reputation to the Chicago branches of each of the firms. The shipments were as follows:

7182 pounds of battery parts (110 pcs.) from Willard Storage Battery Co., Cleveland, to same, Chicago.

6391 pounds of paint (39 pcs.), Tropical Paint & Oil Co., Cleveland, to same, Chicago.

3995 pounds (27 crates; very fragile) dental gas in crated cylinders from Ohio Chemical & Manufacturing Co., Cleveland, to same, Chicago.

Not only was the time of handling the containers as short on the second trip as the first, but the adaptability of the system to fragile commodities was established by the successful handling of the dental gas.

## Use in Mail Service

A use in which the invention gives hope of great possibilities is the transportation of U. S. mail, particularly magazines and periodicals, through its elimination of the handling of the heavy mail bags from truck to car and vice versa. A test is shortly going to be made in the carrying of mail between New York and Chicago.

The “container cars” in regular train service are of two different types, “express” and “freight,” adapted to various commodities and speed schedules. The first is designed for handling in passenger trains and the second for use in freight trains. The “containers” are portable sections built like huge steel safes or boxes, with double strong locks on their doors that may be closed by the key of the shipper himself after loading; when placed aboard the specially designed car the compartments fit down behind a strong steel bulkhead or fence which makes impossible the opening of their doors without the hoisting of the whole compartment.

## Two Types of Haulage

The express type car, equipped with trucks and fittings which enable its interchange with standard passenger



equipment for use in any passenger train, is 66 feet in length. It can hold nine containers, dimensions 9 feet wide by 6 feet long, with an inside clear height of 7 feet 4 inches and a door 3 x 6 feet. The containers are as nearly burglar proof and fireproof as it is possible to make them, are weather tight, and have a carrying capacity up to 3 tons each. Their floors are wooden and they have special attachments for convenient lifting and handling.

The freight-train type, of fifty foot standard length, holds containers of two sizes, 14 feet and 7 feet in length respectively, so that two large and two small of the removable sections fit aboard the car. The freight containers have capacities of 3500 and 7000 tons respectively.

The new-type cars are being manufactured at the plant of the Merchants' Despatch Transportation Co. at East Rochester, N. Y., under supervision of New York Central Railroad equipment experts.

The trucks used in this service, owned and operated by the Motor Terminals Co., are standard White 5-ton chassis with demountable bodies. The demountable bodies are of weatherproof steel frame and wood construction. Their dimensions are 17.5 feet in length, 8 feet width, and 7 feet height (inside dimensions), and their capacity is 10,000 lb. They have double doors in each side and end, the doors being interchangeable. Bars and seals on the doors protect the contents from robbery.

The First Attempt

A subsidiary of the Motor Terminals Co. is the Cincinnati Terminals Co., and it is the success of the use of motor trucks in connection with the railroads of Cincinnati that paved the way for the line-haul extension. In May, 1917, the Cincinnati Motor Terminals Co. undertook as an experiment the handling of all freight between the central station of the New York Central Railroad and its four outlying substations. The system grew with success until now it is in operation in all the 20 freight stations in Cincinnati except the Norfolk & Western, where the installation of the necessary equipment is not quite completed; the motor-truck operation, regulated by a joint railroad telephone dispatcher, has two phases, the handling of freight between contributing independent railroads and between substation and main station of the same railroad. Outstanding figures of the economy effected are the reduction of freight movement 52 hrs. and the decrease of the cost of handling 35 cents per ton, involving an annual economy of \$61,652.96.

Future Possibilities

The application of the motor terminal service in two cities, on an entire haul, envisages the operation of a Motor Terminals Co., working hand in hand with the railroads, in every large city in the country.

The more significant benefits of such an operation as the Chicago-Cleveland

experiment initiates may be listed as follows: Big saving in transportation operation expenses; a big saving in the time required for transportation; increase in inbound and outbound platform floor area; increase in main station trackage; increase in main station realty; release of many cars now required for switching to line service; reduction of present labor almost 33 1/3 per cent; elimination of several handlings of goods now engaging the work of many employees, such as hand-truckers, checkers, clerks, accountants and station overseers, through the extension of the railroad to the door of the shipper; elimination of the greater part of present loss and damage claims; a saving of vast

sums now expended for crates and boxes of all kinds through the use of the unit container, and finally, elimination of the costly charges to shippers that occur when congestion keeps trucks waiting for hours outside freight houses before departing with a load.

Every fleet owner and every man in touch with the automotive industry should stop and think what this plan means. Motor trucks are a vital factor in our country's transportation. It only remains to improve motor truck transportation. The unit container, and railroad and truck co-operation plan is a big step in the right direction. It means quicker, safer, cheaper deliveries. And it means the elimination of congestion.

Do Your Drivers Watch the Brakes?



The Seal of Dependable Performance

Trade Mark Reg. U. S. Patent Office

### Mr. I. Steeronly is Taught a Lesson on Proper Care in Truck Upkeep



LOOK AT THAT BOB, ALWAYS FOOLIN' WITH HIS TRUCK-FIGHTENING THINGS ALL THE TIME HE WASTES MORE TIME THAN ITS WORTH

NOW I NEVER HAVE TO SPEND ANY TIME ON MINE - JUST WATCH ME 'BUD - SET THAT ANAS - THE DEFECT IN A HURRY!

TAKE IT FROM ME - "ONE GUNCE OF PREVENTION IS WORTH A POUND OF CURE!"

TUTTLEH - LITTLE ONE!

LIFE'S TOO SHORT FOR SUCH TOMFOOLERY! WHAT'S THAT? OH - JUST ANOTHER LAMP!

THEN I STEERONLY'S BRAKES LOOSE FOR MONTHS, FAILED HIM ON THE HILL! - A BOX CAR SNASHED INTO HIM, AND HE WAS THROUGH!

MEANWHILE JONES' TRUCK RETURNED WITH HOLIDAY SHIPMENT AND I STEERONLY IN AT HEART TRANS HOME TO FACE THE MUSIC!

BANG! BANG! BANG! CRACK!

SLOW MUSIC AND FLOWER ARE LOUD COMFORT ON ANAS EYE

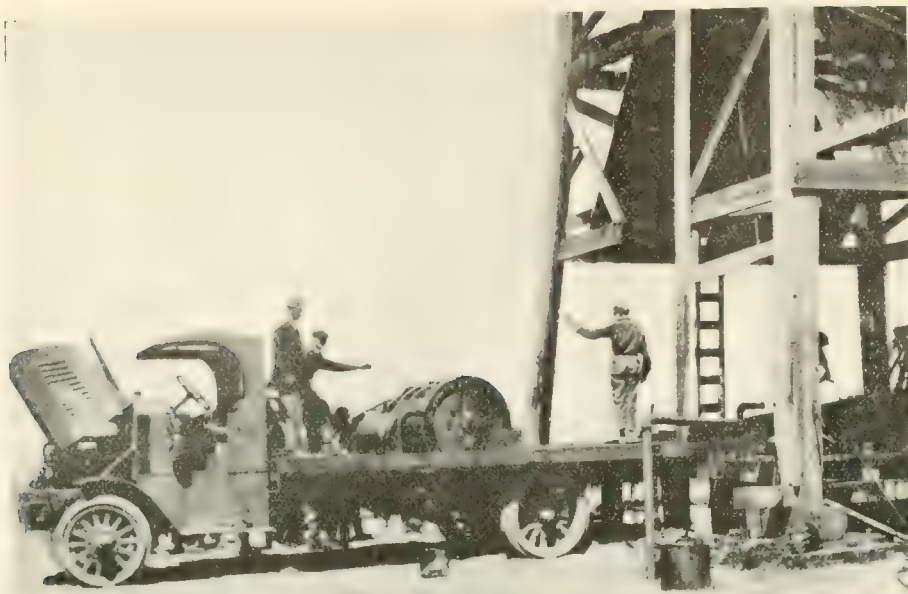
YOU'LL BREAK ME! GET THAT! FIX THAT TRUCK TO-MORROW ANAS DAY! OR YOU'RE DONE! UNDERSTAND?

JONES & CO

MERRY ANAS TO YOU TIM HERE'S ONLY A SMALL PART OF WHAT YOU'VE SAVED UP DURING THE YEAR!

Tighten That Nut or Lubricate That Dry Bearing NOW---It Will Save Time and Money Later.





# Nine Pictures

## SIX USEFUL IDEAS



### Idea No. 1

The company operating the oil well shown at the top of this page finds it more economical to use this portable windlass on the big Mack truck than to install hoisting devices at each of its wells. Methods in the oil fields used to be rather crude, but the truck has helped to bring about efficiency. Aren't there many ancient methods about YOU that could be replaced by modern machinery? Just because it has always been done some other way is no reason why the way could not be changed to advantage.

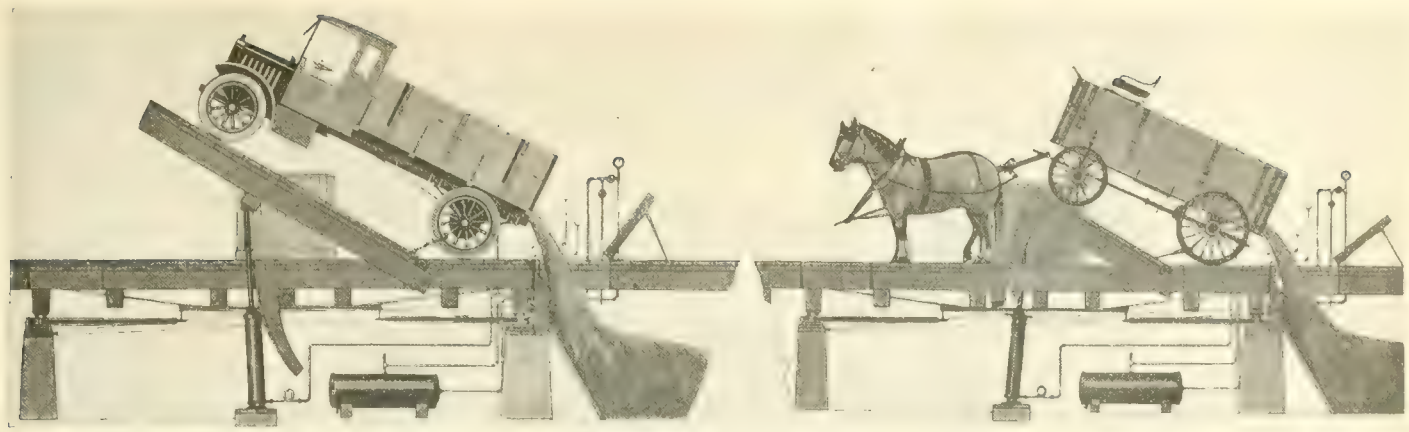


### Idea No. 2

The truck with the long body at the center of this page, like the one at the top of the page, suggests that modern machinery can do things that a few years ago would have seemed improbable. Wherever men and horses are laboring to move things, investigate to see if one simple machine can't do most of the work in much less time. When you save time you add days to the life of the world.





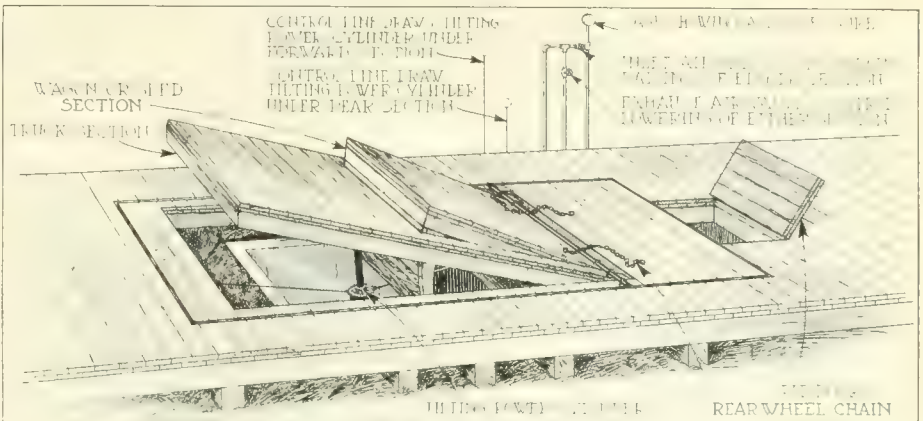


Idea No. 4

The drawing at the right and the two photographs below show how the labor of many men can be saved in case much dumping is to be done and the available trucks have not all dump bodies. The Globe Machinery & Supply Co. makes the device and sells it for \$400.

Idea No. 3

The Stark Bros. Nurseries has learned the lesson of making one machine do several jobs. The machine never complains. It will work to its limit without becoming sentimental or peevish. Have you any machinery which is loafing part of the time?



Idea No. 5

The Texas Co. uses special machinery whenever it can save labor and time. There is an intake and valve control on top of the tank and faucets at the rear with hooks to support cans or pails while they are being filled. Some of this is special work, constructed for this kind of use. Are there not many little efficiencies about your work that could be achieved by a new or changed device?

Idea No. 6

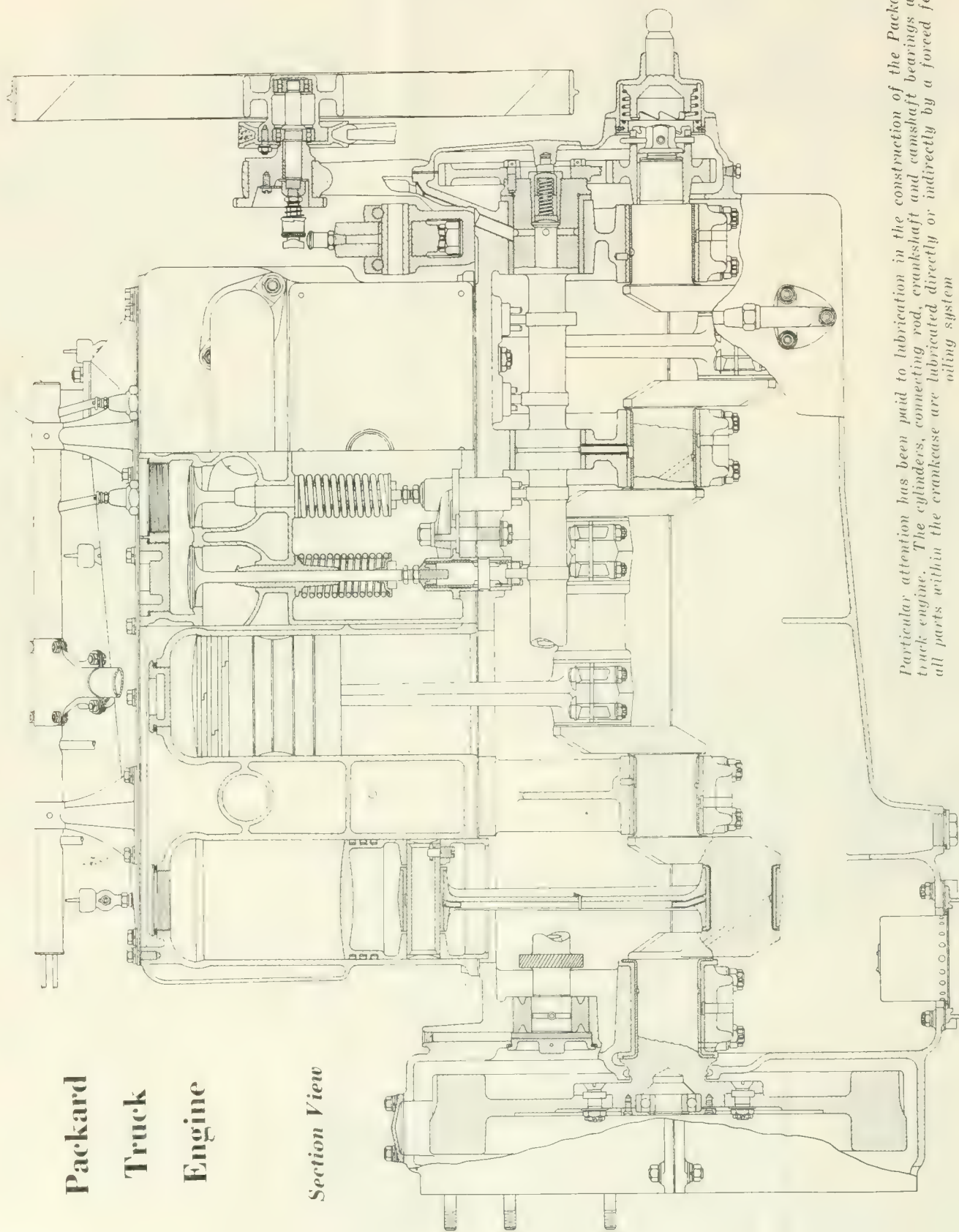
The S. S. Pierce Co., Boston, whose employment application form is shown here, realizes the value of having facts set down on paper. Instead of asking an applicant for a job a hundred questions and trying to remember the answers, it has devised a form which covers things it would like to know about the applicant and which reduces the facts to

Application for Employment form from S. S. PIERCE CO. The form includes sections for: APPLICANT'S ADDRESS, POSITION WANTED, MARRIED?, EDUCATION?, WAGES EXPECTED, AGE, WEIGHT, HEIGHT, HANDS?, PARENTS LIVING?, LIVE WITH THEM?, WHO DO YOU REPORT OR ASSIST FINANCIALLY?, WHAT SERIOUS ILLNESS HAVE YOU EVER HAD?, IS YOUR HEALTH GOOD NOW?, WHEN DID YOU LAST APPLY FOR A POSITION?, AT WHICH OF OUR STORES?, IF YOU EVER WORKED FOR S. S. P. CO. AT WHICH STORE?, IN WHAT DEPT., WHEN DID YOU LEAVE?, NAME OF ANY OF YOUR RELATIVES WORKING FOR US, WHAT RELATION TO YOU?, WHAT IS HIS JOB?, AT WHICH STORE?, NAME OF ANY OF YOUR FRIENDS WORKING FOR US, HOW LONG HAS HE KNOWN YOU?, WHAT IS HIS JOB?, AT WHICH STORE?, WHO WAS YOUR LAST EMPLOYER?, IF NOW EMPLOYED, WRITE NAME OF PRESENT EMPLOYER, ADDRESS, WHAT IS HIS BUSINESS?, WHAT WAS YOUR JOB?, NAME OF YOUR DEPT. OR FOREMAN, WAGES RECEIVED \$ per, HOW LONG DID YOU STAY?, WHEN DID YOU LEAVE?, WHY DID YOU LEAVE?, NEXT PREVIOUS EMPLOYER, ADDRESS, WHAT IS HIS BUSINESS?, WHAT WAS YOUR JOB?, NAME OF YOUR DEPT. OR FOREMAN, WAGES RECEIVED \$ per, HOW LONG DID YOU STAY?, WHEN DID YOU LEAVE?, WHY DID YOU LEAVE?, NEXT PREVIOUS EMPLOYER, ADDRESS, WHAT IS HIS BUSINESS?, WHAT WAS YOUR JOB?, NAME OF YOUR DEPT. OR FOREMAN, WAGES RECEIVED \$ per, HOW LONG DID YOU STAY?, WHEN DID YOU LEAVE?, WHY DID YOU LEAVE?, GENERAL INFORMATION, SIGNATURE, DATE, and a section for the employer to fill out.

writing, where they are always on record? Do you often forget things? Are there facts you gather and then lose? Why not take a look around and see where a few records might save you time and money?

# Packard Truck Engine

*Section View*



*Particular attention has been paid to lubrication in the construction of the Packard truck engine. The cylinders, connecting rod, crankshaft and camshaft bearings and all parts within the crankcase are lubricated directly or indirectly by a forced feed oiling system*



# The Engine on Your Packard Trucks

## Everything You Need to Know, in Car- ing for, Overhauling and Repairing It!

By H. N. Davock\*

**S**INCE the satisfaction and service that will be received from any motor truck depends almost entirely upon the condition of the engine, it is vital that every effort should be made to make certain that the engine is always in as nearly perfect running condition as is possible.

For this reason it is always wise not to wait until serious trouble develops before making a complete overhaul. Where there is a large fleet of trucks in operation it is usually a good plan to have one or two in reserve, and to bring one vehicle at a time into the shops for complete overhauling.

### Experienced Mechanic Necessary

The overhauling of the Packard truck engine is a comparatively simple job but this does not mean that it can be entrusted to an inexperienced man. It is entirely possible, by a single mistake, to put the engine in such condition that it will give unsatisfactory service for a long period or will need large and expensive repairs. For this reason the overhauling should always be in charge of a first class mechanic.

1—When the overhauling of a Packard truck engine is necessary it should always first be removed from the chassis. To do this the radiator should be taken off, the universal drive shaft at the rear of the clutch disconnected, the running gear shift lever should be disconnected and removed. The gasoline line choke rod, the spark, the throttle, the air and gas, the starting crank and the clutch pedal should then be disconnected. After removing the front bumper the engine may be pulled right out of the chassis on to a portable engine stand or it may be lifted by a travelling crane and so taken to the repair department.

The next step is to drain the oil from the crankcase and remove the lower half of the case. Next remove the fan and bracket, carburetor and inlet manifold, the water inlet manifold, the thermostat, water by-pass pipe, the cylinder water jacket cover, the exhaust manifold, the ignition wiring assembly and the spark plugs. The cylinder block can then be loosened and removed. There should then be taken out the oil inlet manifold

and the magneto generator, or if the engine is not equipped with a generator, the magneto driving shaft. Dismount also the power pressure pump, the engine front end cover and gears, the water pump, the starter motor, if there is one, and the clutch, housing and assembly. The connecting rods and pistons may then be easily removed, especially if the engine can be put into a revolving engine jack so that it may be turned bottom side up. The engine is now completely disassembled and the work of inspection of the overhaul may begin.

2—With engine bottom side up in revolving jack, the fit of the crankshaft in the main bearings may be inspected. The endplay of the crankshaft in the bearings is set by the fit in the rear main bearing. There should be .002, .004 in. endplay at this point.

The bearing surfaces should then be examined for scores and scratches. Special pains should be taken to see that the metal has not been pounded out of shape through running with loose bearings which permit irregular motion, and to see also that the bushings and the bearing caps have not become loose from the crankcase or been pounded out of shape for the same reason. When engines have been run for any considerable time with much looseness and play in the bearings, cases have been known where not only the bushings have been ruined, but where the crankcase itself, back of the bushings, has been pounded out of shape so badly that it was necessary to build it up by welding. The crankshaft, main bearings and connecting rod bearings should have a clearance of .001 to .002 in. after they have been scraped or reamed and finish scraped.

### Crankshaft Inspection

3—The crankshaft should be centered in a lathe and tested to see if it has been sprung or become unbalanced. This can be done by the use of a gage held against the shaft as it is revolving. If it has been sprung it must, of course, be straightened and this should be done by main force in a press or with jacks, since any heating of the crankshaft destroys the strength of the steel and is likely to cause breakage or a serious bending within a short time. The crankshaft journals and particularly the pins should be measured by a micrometer and if they have been worn out of round, or become egg shaped, they should be carefully trued up. The thing that is

most likely to wear the pins out of round is either a lack of oil or the use of oil that has become diluted. Frequent change of oil will greatly lessen this wear.

The connecting rods should all be inspected for straightness. To do this, fasten the lower ends of the rods to a piece of shaft of the correct size, then insert another piece of rod through the piston pin bushings. The distance between the shafts at both ends may then be measured and if there is any difference between the two measurements this will show that the rod has been sprung. A better method can be used if an old cylinder block of no further value is at hand. This can be cut vertically through the center of the bore. With this as a test block when the reassembling is done, the rods may be fitted into place and the pistons attached. The lineup of the rods will then be shown by the fit of the pistons against the cylinder wall. If the rods have been bent they may usually be straightened enough by using a heavy wrench or a regular bending bar.

### Cylinder Block Inspection

4—The next point to take up is the cylinder block. The cylinder bores should all be inspected for scores and if these are serious they must, of course, be ground out. When the cylinder wall is smooth a micrometer should be used to determine whether the cylinder has been worn out of round or worn so that the upper end is larger than the lower. If there is distortion of more than a few thousandths of an inch either in shape or the difference between the two ends, regrinding will probably be necessary.

If regrinding is not necessary, but the piston and cylinder are both worn, a good repair job may often be made by fitting a new piston that is a little oversize and then lapping it to a fit of about .004 in. clearance.

The fit of the rings in the cylinder should next be checked. If they have been worn so that the steps of the joint do not overlap, new rings should be installed. The minimum gap allowable in a ring is .010 in. The fit of the rings in the grooves should also be observed carefully. If new rings or a new piston need to be installed, the rings should have a clearance in the groove of not more than .002 in.

The condition of the valves and valve seats in the cylinder should then be carefully noted. If the valves are pitted

\*Manager of technical service department, Packard Motor Car Co.



or warped they should be refaced by grinding the valve in a speed lathe. A skilful man may work them down with a file but this should be done very carefully so that the angle of the seat on the valve itself is not changed. Otherwise it will be difficult to obtain a good seat when grinding-in the valve.

Before grinding-in it may be necessary to reseat the valve in the cylinder because of pit marks in the valve seat. If this is necessary, a 45 deg. seating tool should be used, and after it has been used, the top of the seat should be faced down so that the contact width is .0884 in. on all valves in a model D, .066 in. on the inlet, .093 in. on the exhaust in a 1, 1½ and 2E, EC and EX models, and .190 in. on all valves in 3, 4, 5 and 6E and ED, EF and EY models.

All the factors just mentioned have a direct bearing on compression, and if an engine is being overhauled, all of these points should be checked up and repaired if necessary. If all have been done properly the engine will give its normal compression and deliver its normal power. The compression should be checked with a pressure gage after the engine has been reassembled, but it is obviously very difficult to correct after the reassembly any slackness in this part of the overhauling.

### The Water System

5—The water circulation system is to be taken up next. All water circulation hose should be carefully examined both for possible leaks and to make sure that none of the lining of the hose is in danger of becoming loose and checking the flow of water.

If the engine is equipped with a thermostat it should be disassembled and the valves examined for tightness on the stem. The thermostatic action of the syphon should also be checked. This should be done by immersing it in hot water and it should be remembered that the syphon is likely to be injured in this test if it is removed from its housing before the test is made. The bypass valve should open at a temperature of between 125 and 150 deg. There may be a very considerable waste of gasoline in a cold climate if the thermostat is not operating properly. The water pump should then be dismantled and the fit of the impeller on the shaft should be checked. If it is loose a new key will probably be required. It may even be necessary to replace the shaft entirely if it has been badly worn by the packing or if chemicals used in the water have eaten the shaft.

The radiator should be tested by immersing it in water under air pressure to find out whether there are any small leaks that may develop serious trouble when it is returned to service. Such leaks, of course, should be soldered up.

6—In overhauling the lubricating system, all oil pipes should be removed and thoroughly cleaned with kerosene or some other cleaning compound. The oil passages in the crankcase and at the camshaft should be thoroughly cleaned also. This can best be done by blowing them out with air.

The oil regulator manifold on the front of the engine should be disassembled and thoroughly cleaned, especially the strainer. The strainer at the oil pump inlet in the bottom of the crankcase must also be cleaned.

It is also desirable to examine the square oil pump driving shaft. With a truck that has been out of doors all night in cold weather, this shaft is likely to wear at the ends because the heavy oil becomes congealed and thus throws an unusually serious load upon it. There is seldom any repair necessary to the pump itself as a result of wear, but occasionally the pump body is damaged through being struck by objects in the road.

It should be remembered always that foreign substances in the oil, either dirt or the residue from oil that has not been changed and has worn out and lost its lubrication qualities, does far more

### Truck Engine Overhaul

Fleet superintendents and mechanics who wish to refer to articles on the overhaul and constructional details of the different makes of truck engines will find them in the following issues of The Commercial Vehicle:

	1921
Mack .....	April 1
Waukesha .....	April 15
Packard .....	This Issue
Wisconsin .....	Next Issue

### They Will Save Time in Repair and Overhaul

damage to moving parts in the Packard truck engine than friction ever does. Frequent changes of oil and care in making certain that the oil is clean are thus distinct economies.

### Overhauling Electric System

7—In overhauling the electrical system the starter or generator, if the truck is equipped with them, should first be tested for open circuits, shorts, or grounds in either the armature or the field windings. If the commutators have become rough they should be turned down in a lathe, and the mica insulators should be undercut with a graving tool so that they are below the surface of the brush contacts. If the brushes are worn to any extent they should be repaired. It is particularly necessary that if the armature bearings are worn they should be replaced, because vibration in the armature rapidly destroys the electrical apparatus. The terminals of all wires should be closely examined because the vibration and shock to which a truck is subject tend to loosen them or break them entirely.

If possible the magneto should be tested on a bench under speed to determine whether it delivers a spark at all speeds. If it is necessary to disassemble the magneto, remove the dust covers, the magnets, the ends of which are connected with a keeper bar to preserve their magnetism, the winding, the dis-

tributor and the breaker housing. The winding should be tested for short circuits. If ridges have been worn into the surfaces of the distributor, or if brushes are badly worn they should be smoothed if possible, and if this is not possible, they must be replaced. The rotor shaft bearings should be replaced if they have been worn excessively, that is so that it is possible for rotor lobes to strike the field structure. During this part of the inspection, the frame end supporting the bearings should be securely tightened.

### The Gasoline System

8—In overhauling the gasoline system, the gasoline tank mounting should first be inspected to make sure that vibration, road weaving and shock have not loosened up the fastenings so that the tank can chafe. The gasoline outlet should be removed and the tank blown out with air to clear it of any sediment. If there is a sediment trap in the gasoline line it should also be cleaned, and the entire gasoline line itself should be blown out. In checking up the carburetor the float should be removed. It may be tested for a leak by simply shaking it. The screen should be removed from the filter well under the float chamber where the gasoline spray jet should then be removed and the inside of the carburetor cleaned by blowing out with air. The auxiliary air valve assembly should be removed, the valve stem cleaned and the facing riveted to the seat if necessary. The throttle valve should be inspected to make sure that it has not worked loose on the shaft. While the carburetor body is detached from the float chamber the gasoline level in the spray jet should be tested. The proper level is ¼ in. below the top of the jet.

9—The gaskets which require the closest inspection are those between the exhaust manifold and the cylinder and between the manifold and the muffler pipe. Unless the gaskets at the carburetor in the manifold and at the cylinders have been covered with shellac or some other similar substance they very seldom need replacement unless they have been damaged during the disassembling. If the cylinder chamber plug gaskets have been squeezed or damaged in any way they will require replacement to avoid the possibility of compression leaks.

This completes the overhauling and repairing of a Packard truck engine. Reassembling should be made in the reverse order that this disassembly took place.

**M**OTOR Vehicles and Their Engines, published by the D. Van Nostrand Co., New York City, is a practical handbook on the care, repair and management of motor trucks. It should be of invaluable service in truck garages. The simplest language has been used and technicalities have been reduced to a minimum. The authors are Edward S. Fraser of the American Bosch Magneto Co. and R. B. Jones of the Willys-Overland Co. The price of the book is \$2.



# You Don't Have to Do It, But—

## Old Hammerhead Talks About Cooperation

By SINCLAIR GLUCK

OLD Gunther leaned back in his chair and let his glance flicker over the young driver, standing beside his desk.

Gunther, or Old Hammerhead, as his men called him, was the grim and capable old president of the town's largest commercial house. Young Condon was his youngest driver. But as they faced each other, there was a bond of mutual respect between the two of which each was conscious.

Condon was tall, dark-eyed and wiry, late of the A. E. F. motor transport and a wildcat for speed. There was a lazy recklessness in his whole bearing. He was a fellow to handle with gloves.

After a moment's inspection the old man laughed suddenly, a hearty genial laugh that warmed the hearer. "Well, Condon, driving a truck in city traffic must be pretty tame after France, eh?"

Condon's lazy glance flashed in surprise. "Why, yes, sir, it's pretty tame, but Ross put me on one of the long runs—Tomkins Ferry—and—well, we make pretty good speed, I guess." He ended, smiling a little.

The old man nodded. "Well, speed means good service, up to a certain point. But I guess I can trust you not to smash up the truck, or drive fast enough to damage the load or get us into trouble with the authorities. And of course you know that careful driving means a longer life for the truck, as a rule."

"The truck's in pretty good shape, sir," Condon answered. "Haven't had a repair on her since I took her over."

"I know that. But I asked you to step up here because I wanted to talk to you about this new scheme of Ross's. You know he wants to make the drivers their own truck inspectors. Thinks it will keep down maintenance costs." The old man leaned forward. "Our costs are high, you know. Sit down, Condon."

The young fellow sat down and leaned back in his chair. "Did Ross tell you that I didn't like his scheme, sir?" he asked bluntly.

Old Hammerhead nodded. "Yes. He liked the scheme pretty well. Then you spoke up against it. So he brought the thing to me to decide. And I thought I'd like to have your side of the matter." Old Hammerhead broke off and glanced

at the young driver inquiringly.

Condon shifted in his chair. "Why—I—we're drivers, sir; we're not a bunch of mechanics. Inspecting the truck isn't part of my work. It's out of my line. Let the mechanics attend to their end of the business and I'll attend to mine."

Old Hammerhead nodded. "Just what was his scheme, Condon?"

"Why, he wanted the drivers to fill out a long list of questions every night—on the condition of the truck. If there's anything wrong with my truck I'll let him know about it. But I can't see any sense in my filling out a long list of questions when I haven't got anything to report. That's not part of my work."

Old Hammerhead straightened up in his chair suddenly. "Well, now, I'll tell you what I think about it. I think the scheme is a good one. And I'll tell you why—you admit that you're not a mechanic. Therefore, a symptom in an engine that might not mean anything to you might mean a lot to a mechanic. So if you report anything peculiar about your engine, even if it isn't anything wrong, you may and probably will help the mechanics to catch a little fault before it grows into a big one."

"You see, Condon, it's repairing the big fault that costs money—not catching and repairing the little one. So I think we'll try out Ross's scheme."

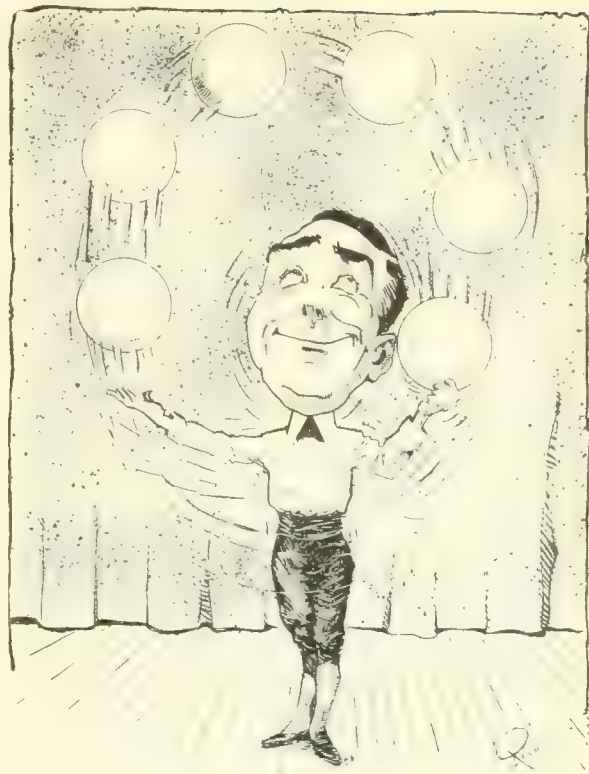
"But aside from that, I don't think your objection to the scheme will hold water, Condon, do you?"

"What do you mean, sir?"

"Why, you say that filling out a report sheet is not part of your work. That is wrong in the first place, because anything you're asked to do while you're with this company is part of your work. But suppose it were not part of your work. Suppose you didn't have to do it. Is that any reason for not doing it—supposing it is for the general good of the company?"

"I signed on as a driver, sir."

The old man laughed. "Come, come, Condon. You signed on as a driver in the army, didn't you? But that didn't prevent your doing K. P. for a bit."



"But aside from that, a man who won't do more than he has to do is a weak sort of fellow; don't you think he is? And you never struck me as being weak. Besides, a man never gets anywhere with that point of view, Condon. You see, an employer doesn't judge by a man's appearance. He judges by his performance. We're all pretty much alike. And as long as you work for anybody, you won't get far if you don't do any more than you have to."

"But suppose you're working for yourself. Suppose you lay out a certain sort of a business you're going to build up. You think you'll have so and so to do. Then if something else comes up to do, I suppose you're not going to do it, just because you hadn't planned to do it in the first place, eh? Nice sort of business you'd build up at that rate. You don't have to do it, but—"

"No, Condon, you'd cooperate with yourself, to the best of your ability, in your own business, and it's up to you to cooperate with me to the best of your ability in mine."

"I like you. And I think you're a good driver. But that point of view won't get you far with me. Nor will it get you far with anyone else. Why, man, think of a juggler. Have you ever seen one keep six plates in the air at once? He doesn't *have* to keep six. He'd still be a juggler if he kept only two in the air. But he keeps six going because he's a *good* juggler. Now what do you think about it?"

The old man had spoken with vigor, but with a genial smile in his eyes. For a moment young Condon hesitated. Then he got slowly to his feet. "Well, I guess I'll fill out Ross's questions, sir. It's different when you tell it."

# The Right Way to Charge Interest!

## Interesting Cost Figures on a Second-hand Truck That Delivered Ice Cream, Supplied Ice Free to Soda Fountains and Helped Build Up a Business

**K**EEPING accurate cost records on your trucks is like taking a trip round the world—you learn a lot of things that you never even thought of before—and you learn something new almost every day.

There are new methods of estimating certain cost items which are a little more accurate than the old ways; there are new methods of reducing the amount of various items of cost; there are new wrinkles in selecting the type of rolling equipment in the first place which will do a certain type of haulage in the most efficient and inexpensive way.

There are two ways in which these money and time savers can be learned: by experiment and by the experience of others. And the latter is by far the cheaper and quicker way.

Moreover, something can be learned from almost every man's experience. That is why the truck cost records of various individuals all over the United States are laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks and reproduced and analyzed in these pages.

### With a Second-Hand Truck

The cost figures reproduced on these pages are from the records of the Hollingsworth-Turner Co., South Bend, Indiana, manufacturers of ice cream. They are the cost records of a 1-ton Service truck, bought second-hand at a total cost of \$1600, including tires.

The company's comments on the work of the 1-tonner are interesting:—"Our 1-ton Service truck takes care of between sixty and seventy customers a day, averaging about 40 miles and delivering 200 gals. of ice cream.

"The truck is 2 years old. Every morning it starts out with a load of ice and ice cream and makes the round of the dealers in South Bend. It delivers the ice cream and packs the ice cream and soda fountains with ice, which must be renewed every day. This service is given our customers without extra charge.

"Apparently there is no limit to the consumption of cones, sundaes and bricks during the hot weather; and even during the winter months the sale is steady and profitable.

"No doubt one reason for this is that ice cream is handled almost everywhere.

If you live in the city, you don't have to go more than a block or two to find a drug store or candy shop where ice cream is sold. Even in the country it is easily obtainable, *because perfected packing and delivery methods make it possible for any kind of a store to handle it profitably.*" (The company laid no

particular stress upon this last. The italics are our own. And we italicized it because it about tells the story of why the company has made a success!) "In fact, selling ice cream is largely a matter of keeping the retailer's supply equal to the demand. Our goods must be delivered before they are sold, and our

The Commercial Vehicle—Truck Cost System			
Year <u>1920</u>		Month ending <u>June 1</u>	
Make of truck <u>Service</u>		Gasoline <u>Electric</u>	
MONTHLY COST SUMMARY SHEET U. P. C. BOOK COMPANY, INC. 243 249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline	<u>1289</u> gals.	<u>25¢</u>	\$ <u>322.25</u>
Current	— kw-h	—	—
Oil	<u>232</u> qts.	<u>15¢</u>	\$ <u>34.80</u>
Grease	— lbs.	—	—
Kerosene	— gals.	—	—
Waste	— lbs.	—	—
Dist. Water	— gals.	—	—
Driver	<u>290</u> days	<u>\$5.</u>	\$ <u>1450.00</u>
Helper	— days	—	—
Mechanic	— hrs.	—	—
<b>A—Total Operating Charges</b>			\$ <u>1807.05</u>
<b>Maintenance Charges</b>			
*Tires	<u>11,600</u> miles	<u>\$0.0169</u>	\$ <u>196.04</u>
Repairs	<u>11,600</u> miles @ <u>\$0.0172</u>	—	\$ <u>200.00</u>
Overhauling, painting, etc.	<u>Included in Repairs</u>		—
Spare vehicle rental	<u>None</u>		—
Garage rental (pro rata)	<u>@ \$10 per month</u>		\$ <u>120.00</u>
<b>B—Total maintenance charges</b>			\$ <u>516.04</u>
<b>Fixed Charges</b>			
Insurance, fire	—	per year	\$ <u>85.00</u>
Liability	<u>\$85</u>	per year	—
Collision	—	per year	—
Interest	<u>60</u>	(On Item 1)	\$ <u>60.00</u>
Depreciation on chassis	<u>11,600</u> miles @ <u>\$0.358</u> per mile	—	\$ <u>415.28</u>
Depreciation on body	—	—	—
Depreciation on equipment	—	—	—
*Depreciation on tires	<u>See above</u>		—
Total taxes and licenses	<u>Taxes \$5. License \$20</u>		\$ <u>25.00</u>
<b>C—Total fixed charges</b>			\$ <u>621.28</u>
			\$ <u>2908.37</u>
*Note: Omit one of these.			

Considering that this truck covered 11,600 miles in the year and delivered a very large quantity of ice cream during the 290 days it operated, the total cost for the year of \$2,908.37 is not high. But this low cost is partly due to the fact that the truck was bought second hand, which reduces the interest and depreciation items



sales are governed by the regularity and speed of our deliveries." (Again the italics are our own.)

## Truck Gets Hard Usage

"The truck gets very hard usage, because salt water is constantly dripping over its rear parts, which causes very rapid rusting and deterioration. In spite of this, our Service has stood up very well and given us very dependable service.

"For the year ending June 15, 1920, the 1-ton truck cost only \$10.03 per day, including the driver. This is figured on a total of 290 days operated, in which it travelled 11,600 miles. As it averaged 200 gals. of ice cream per day, the delivery cost works out at 5 cents per gal.

"The truck has had no lay-ups or repairs and has never given any trouble. And it is doing work which would be

impossible to horses, because either the distance travelled is too great or the

## What the System Costs

On these two pages are shown filled-in sample sheets of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

number of trips is too large. As a truck will deliver more ice cream than a 2-horse wagon, and as the operating cost is about the same, it is easy to see that we can make deliveries both quicker and cheaper with trucks."

An analysis of the figures shown on these two pages brings out some interesting points. In the first place a glance at the cost sheet on page 250 shows that the item of driver's wages is at least three times as high as any other cost item.

## Efficient Operation

If the other figures are correct, the above fact is a sign of very efficient operation. For it shows that the company hires a good driver, pays him well and through his careful handling of the truck, reduces costs extensively in other directions.

The gasoline cost is low, both because the gasoline was bought in large quantities and bought at a comparatively low price per gallon and because the truck was driven efficiently and therefore in a manner economical of gasoline.

The tire cost item is also low. Indeed, it looks too low. But the tires with which the truck was equipped were included in the second-hand purchase, so this item is probably correct in this instance.

There were no repairs on the truck, so there were no actual repair costs. The item of \$200 is estimated on a mileage basis @ \$.0172 per mile and is a reasonable estimate.

## How Interest Is Charged

But the most interesting item is the charge for interest. It will be noted at once that 6 per cent on the original price of \$1600 would be \$96. But instead of charging off \$96 for this item the first year, the company has figured that as they are charging off a fourth of the total value each year in depreciation and as the interest on the investment should therefore decrease by one-fourth each year, the interest charge should be averaged over the four years in which the truck is depreciated.

So they have taken the original investment of \$1600 for the first year, the depreciated investment of \$1600 less \$400 or \$1200 for the second year, this amount less depreciation (\$1200 less \$400) or \$800 for the third year, and this amount less depreciation (\$800 less \$400) or \$400 for the fourth year. They have added these four amounts together, which gives them \$4000 or the total amount on which interest should be charged over the four years. Dividing this amount by 4 gives them \$1000 on which interest should be charged each year and 6 per cent on \$1000 is \$60. Therefore, the total amount of interest chargeable each year is \$60 and it is this amount which appears on the cost sheet.

This is a much more accurate method of figuring interest than the method sometimes used, of charging a straight 6 per cent on the original total each year.

## The Commercial Vehicle—Truck Cost System

Number of Truck 13-E

Capacity in lbs. 2000

Chassis No. \_\_\_\_\_

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 241-249 WEST 39TH ST. NEW YORK

Investment	
Cost of chassis, less tires	<i>Second Hand</i> \$1 430 70
Cost of body	
Cost of equipment	
Cost of tires	<i>Second Hand</i> 169 30
1—Total cost, complete	\$1 600 00

Performance Record	
2—Days operated	290
3—Days idle	75
4—Days maintained Item 2—Item 3	365
5—Total hours operated	2320
6—Total miles covered	11,600
7—Total trips made	290
8—Total <del>ton-mile</del> packages <del>or stops</del>	58,000

Performance Averages	
9—Average miles per day maintained (Item 4—Item 4)	31.78
10—Average miles per day operated (Item 6—Item 2)	40
11—Average miles per trip (Item 6—Item 7)	40
12—Average <del>ton-mile</del> packages per trip (Item 8—Item 7)	200
13—Average commercial <del>ton-mile</del> package-miles <del>or stop-miles</del> per trip	(Item 11 x Item 12) 4000

Recapitulation	
14—Total expenses for <del>month</del> <i>year</i> (Sum of Items A, B and C)	\$2908.37
15—Cost per day operated (Item 14—Item 2)	10.03
16—Cost per day maintained (Item 14—Item 4)	7.97
17—Cost per mile operated (Item 14—Item 6)	2.507
18—Total commercial <del>ton-mile</del> package-miles <del>or stop-miles</del> (Item 7 x Item 13)	1,160,000
19—Cost per commercial <del>ton-mile</del> package-mile <del>or stop-mile</del> (Item 14—Item 18)	\$.0025

The final figure in the above recapitulation of costs and records is of interest. In this case the unit taken is the commercial package-mile, instead of the usual ton-mile, to obtain a final cost on the package-mile as a unit (\$.0025), taking a gallon of ice cream as a package. The cost per gallon was \$0.0514

# The Better Way

## To Save Time in Truck Repair and Maintenance

### No. 448—Marking Cotter Pin Hole to Save Time

**T**O mark the position of the cotter pin hole in the end of a bolt before assembling the nut, may not appear to have much in its favor. However, it requires less time to make a small mark on the end of a bolt in line with the cotter pin, screw the nut to this position and insert the cotter than it does to leave it unmarked and locate the position of the cotter pin hole after the nut is pulled tight. It takes only a fraction of a minute to scratch a mark on the end of the bolt with a file, but this mark is easily lined up with the slots in the castellated head of the nut and on a job of replacing connecting rod caps under the truck, these notches simplify and expedite the work.—H. BROWNE, Newark, N. J.

### No. 449—Lifting Out Valve with Electromagnet

**I**N some engines, especially those that have no detachable heads and have the valve set down deep in the firing chamber, it is sometimes difficult to get hold of them when it is desired to lift them out for grinding. An electromagnet will solve the problem. Scrape the carbon off the head of the valve giving a clean surface that will make a good contact with the magnet, snap on the current and lift out the valve. A

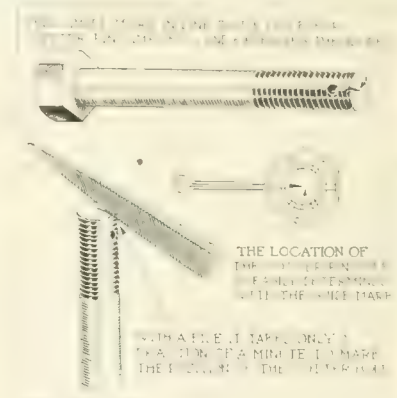
***T**O help motor truck owners and operators to save money in the maintenance and repair of their trucks. THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

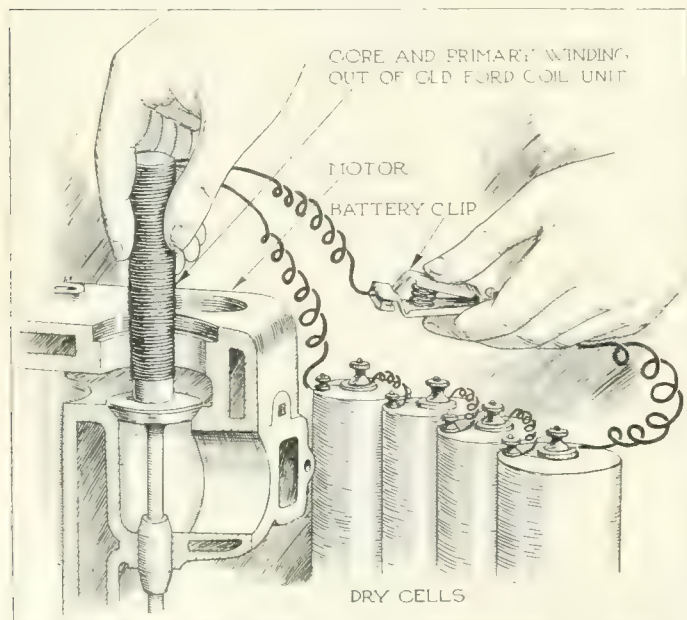
good magnet for this purpose can be had by taking the core and primary winding out of an old Ford coil unit.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.

### No. 450—Peening Valves to Clean Them

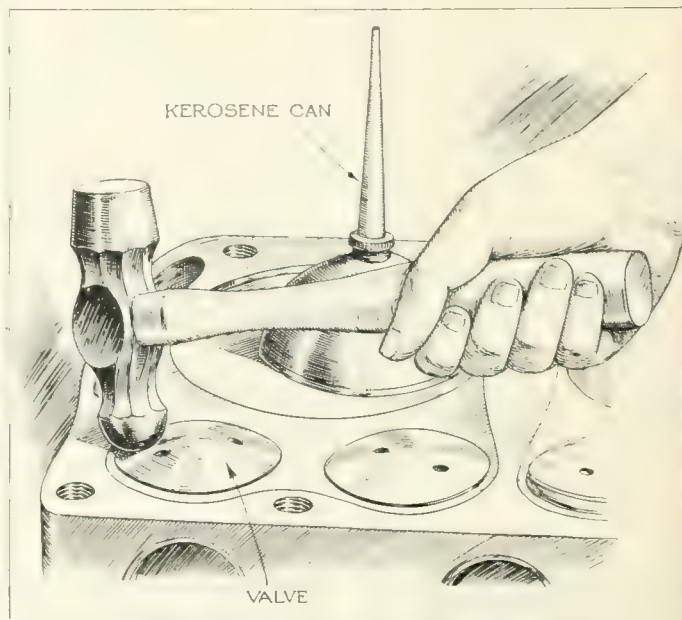
**S**OMETIMES when the head is taken from the engine to clean out the carbon, the mechanic does not care to grind the valves. An acceptable substitute job can be done by peening the valves lightly with a small ball peen hammer and a little kerosene. This knocks off the carbon from the valve seats and will almost equal a complete regrinding job. Raise the valve slightly to allow the kerosene to seep around the seat. Then be sure the valve is fully seated and peen lightly around the edge of same.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.



No. 448—Marking Cotter Pin Hole



No. 449—Lifting Out Valve with Electromagnet



No. 450—Peening Valves to Clean Them

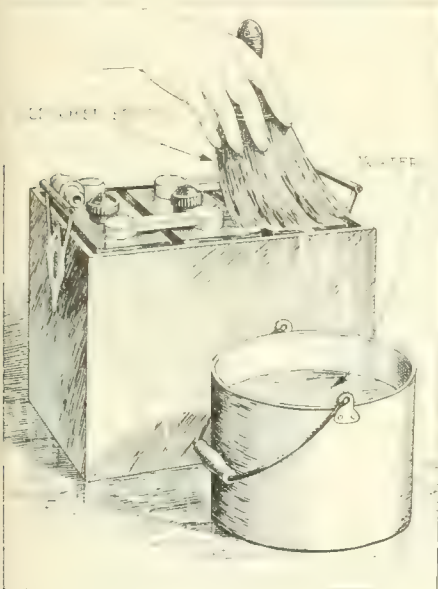


### No. 451—Cleaning Battery with Old Whisk Broom

ELECTRIC lighting and starting troubles may be often traced to poor connections on the battery. A certain amount of dirt will collect on top of the battery. A certain amount of spilled electrolyte and corrosion is always present on top of the battery. To prevent corrosion of the posts, connectors, etc., brush the top of the battery with a whisk broom and clean water every time it is filled with distilled water.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.

### No. 452—Auxiliary Brake Springs Reduce Wear

THIS device consists of the installation of two auxiliary brake springs on the inside of the brake drum, where trucks are equipped with the combination of internal and external double-act-



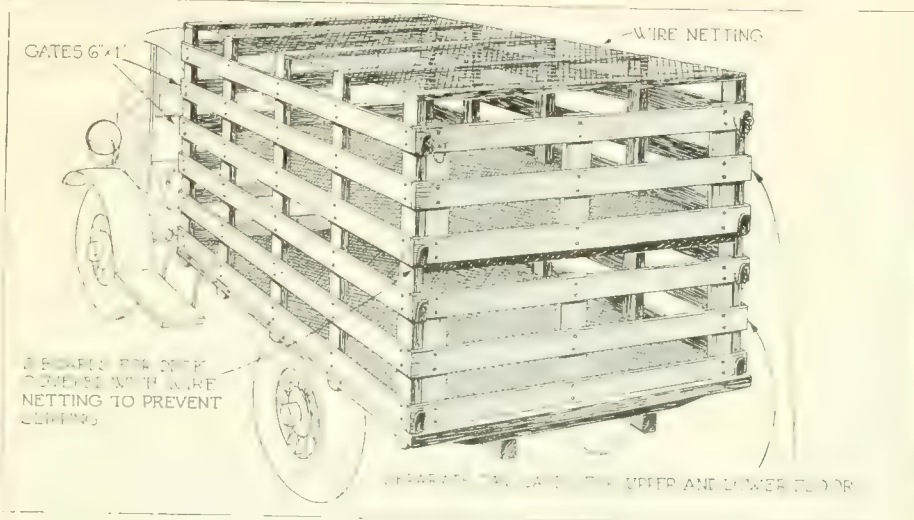
No. 451—Cleaning Battery

ing band brakes. If the springs are installed as shown, they will not only release the brakes when the brake lever is released, but they will also pull the bands in at the ends so that the wear will be materially reduced. Each spring is attached to one of the spring arms and a wire is wrapped around the axle and attached to the other ends of the two springs. This method allows of a more direct inward pull on the bands than does the other method with a single spring stretching across from one spring arm to the other.—CLINTON H. KENYON, Kenyon's Garage, New London, Conn.

The top is covered with wire netting.—VINCENT NESSEN, Pueblo, Colo.

### No. 454—Cotter-Pin Lock for Non-Skid Chains

WHEN it becomes necessary to put on the skid chains in wet weather, the jarring of the wheel on the road or the fact that the chains are somewhat hastily attached by the driver sometimes results in the clip which fastens the chains together coming open. At the best this will mean too loose a chain and

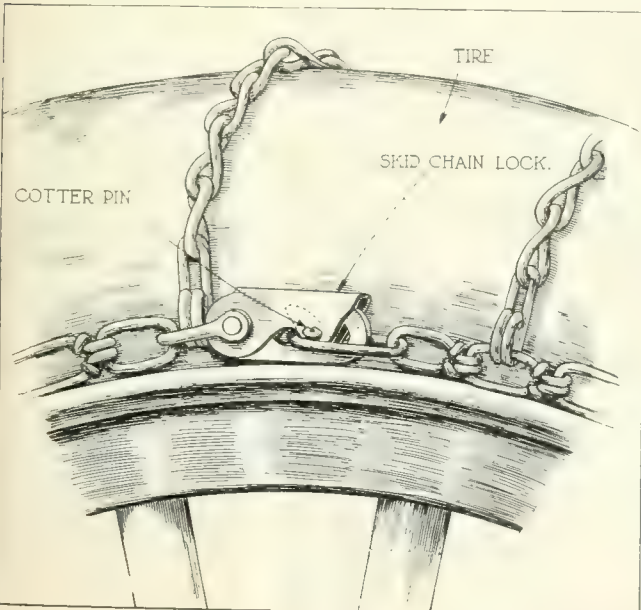


No. 453—Double Deck Body for Live Stock

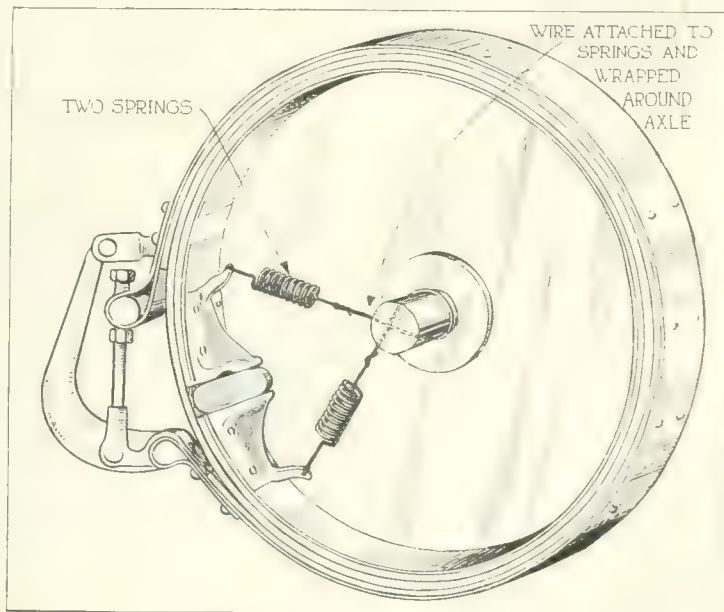
### No. 453—Double Deck Body for Hauling Live Stock

THE accompanying illustration shows a good body layout for carrying sheep and other live stock. This body has two floors, each with its own tailgate. Both the upper and lower floors are covered with wire to keep the stock from slipping. Two-inch material is used for the floors. The stakes are made of 2 by 4's and are held in place by iron straps.

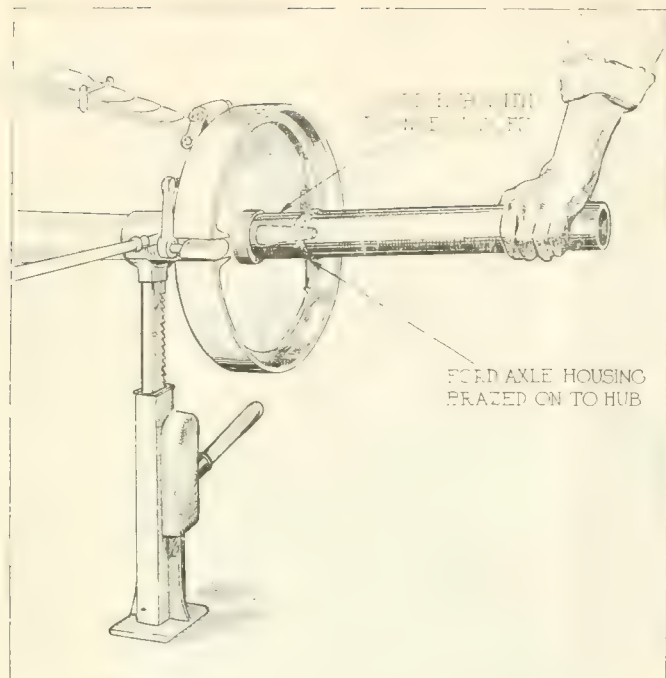
at the worst it may mean that the chain comes off altogether and is lost, to say nothing of the danger of an accident, through depending on a chain which is no longer on the tire. To prevent the clip from coming open, a small hole may be drilled through the clip and hook and a small cotter pin inserted and spread, in the manner indicated in the accompanying illustration. Note that with the pin in place the clip cannot open.—DEWITT F. RAHM, Little Falls, N. Y.



No. 454—Cotter-Pin Lock for Chains



No. 452—Auxiliary Brake Springs



No. 456—Jig to Straighten Ford Rear Axle

### No. 455—Removing Grease Cups That Have Broken

WHEN a grease cup breaks off it is often found difficult to remove the part that still remains. By hardening the handle end of a file the file can be tapped in as shown in the accompanying sketch, making a square inside of the remaining portion. By turning the file the portion will come out.—CHARLES BOEHME, Gobel's Garage, Brooklyn, N. Y.

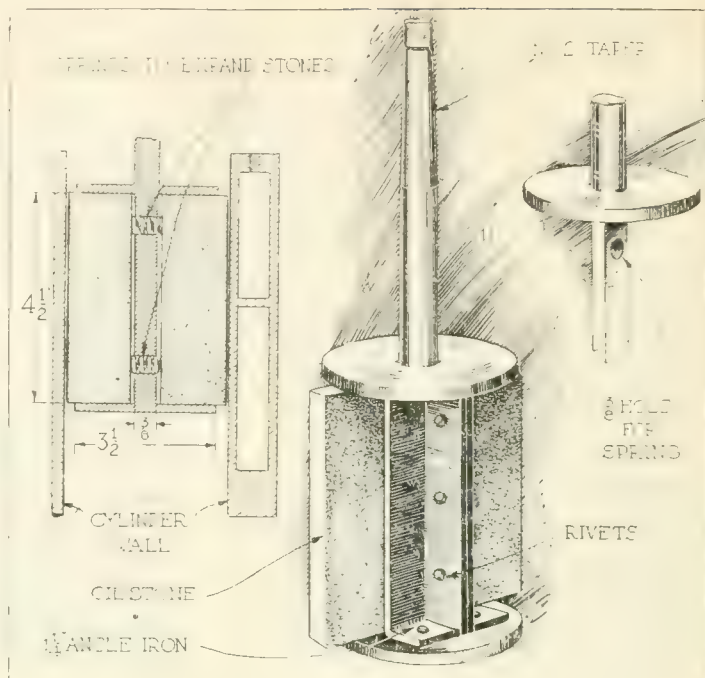
### No. 456—Jig to Straighten Ford Rear Axles

WHEN the rear axle of a Ford is bent in an accident it must, of course, be straightened, but if the job is sent out and the straightening done in a service station, it may be a considerable expense if the job is a long one. Here is a jig, made in the home repair shop, with which the axle can be straight-

ened and which will save this expense. The jig is made by brazing an old Ford driveshaft housing to an old Ford rear wheel hub from which the flange has been ground. The wheel is removed, the high side chalked, and the axle bent back to position in the manner shown in the accompanying illustration. It should be noted that with this method it is not even necessary to disassemble the axle, unbolting the spring shackles and so forth.—WALTER CROSBY, Lalime & Partridge, Inc., Boston.

### No. 457—Home Made Tool for Grinding Cylinders

THE accompanying illustration indicates the method of constructing this home made cylinder grinding tool. This tool is designed for grinding Ford cylinders. Two India No. 24 coarse oil stones are held in position by angle irons extending between the two flanges and are pushed out against the cylinder walls

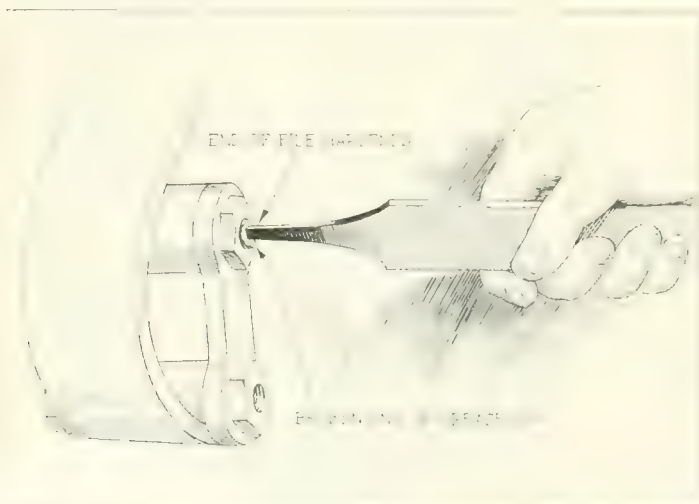


No. 457—Tool for Grinding Cylinders

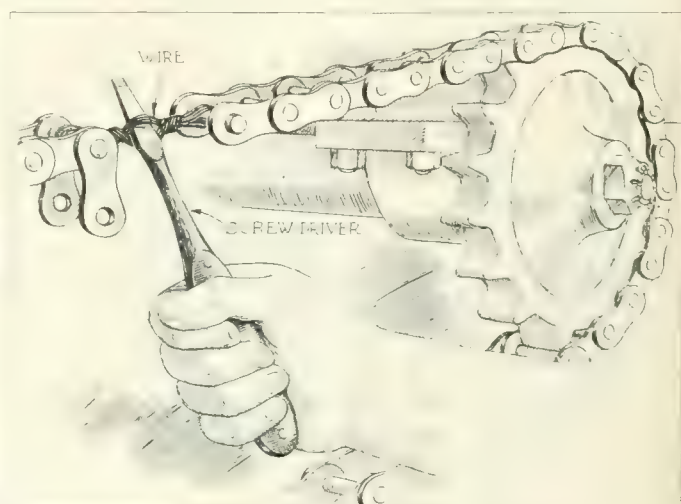
by two coil springs set between the two stones in the center of the device. The cylinder block is set on the drill press table and the grinding tool inserted in the drill press chuck, so that the drill press supplies the grinding power. The two sketches and the sectional view indicate the sizes and proportions of the different parts and the manner in which the device is constructed.—WALTER D. CROSBY, Lalime & Partridge, Inc., Boston.

### No. 458—Tightening Chains with Wire

SOMETIMES when a drive chain breaks it is a difficult or mean job to put it together again without a chain tightener. A piece of wire is most always available and will do very well in an emergency by locking both loose ends of the chain together and then twisting the wire with a screw driver.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.



No. 455—Removing Broken Grease Cups



No. 458—Tightening Chains with Wire



## Buyer's Department of The Commercial Vehicle

### Welded Gravity Dump Body for Light Trucks

A WELDED gravity dump body for Fords and other light trucks is the latest product of the Heil Co., Milwaukee, Wis. Though this body is especially designed for contractors' use in road building, it is also adaptable for the hauling of coal, earth, gravel, sand and other building materials. This body is built in various sizes ranging from  $\frac{3}{4}$  of a yard to  $1\frac{1}{2}$  yards in capacity. They may be used on trucks ranging in size from  $\frac{3}{4}$  to 2 tons or more. In the case of large trucks, dual hoppers are used in place of single bodies, their operation being similar to the single bodies.

There are no rivets in the body, the welded construction making an absolutely water tight body and therefore well adapted for handling of wet concrete.

The operating device is very simple. The control which holds the body in place, consists of self-locking hooks, held in place by springs. The control handle for operating these locking hooks can be reached by the driver without getting out of the cab, thus accomplishing a saving of time.

Nearly fifty parts have been eliminated in the operating device. The body rolls over on pivots which prevent it from ever getting out of line.

Instead of using control chains two bars or rods are attached to a cross member which connects the longitudinal parts of the subframe.

Into these are placed coiled springs, which keep the body firmly in place when in the raised position. The springs

allow the body to roll over easily when loaded and keep it from rattling when empty. The body dumps at an angle of 60 deg., thus aiding in the disposal of sticking material, such as wet clay, etc.

The material used in the construction of the Heil body is 12-gage steel, flanged at the top to give strength and rigidity. The bodies are shipped ready to be bolted to the chassis with four U bolts, which are furnished. The price, a feature, is \$100.



*The new Heil body pivots and dumps at angle of 60 deg., thus aiding in the disposal of sticking material, such as wet clay, etc.*



*Two elevations are possible with Fitz Gibbon & Crisp hoist and body, a high position for chuting coal to cellars and a low lift which raises the body to an angle of about 45 deg.*

### All-Steel Dump Bodies for Hauling Coal

ONE of the latest products of Fitz Gibbon & Crisp, Trenton, N. J., designers and builders of truck bodies and hoists, is the Model M high hoist built in 2, 3, and 4-ton capacities. These hoists have steel lifting arms, cut gears and racks for raising the body. The gear train is connected with a power takeoff

by a sprocket chain. There are no lifting chains, all the strain being carried on steel cut racks and pinions.

These hoists have all-steel bodies and understructures. The bodies are raised a minimum height of 11 ft. from the ground in front and 7 ft. from the ground in the rear at the high hoist position, giving a 30 deg. discharging angle.

There are two elevations, the high hoist position for chuting coal to cellars and the low lift which raises the front of body to an angle of about 45 deg.

The following table gives the body dimensions of the three capacities:

Size	Length	Width	Height	Capacity
2	9 ft.	65 in.	15 ft.	60 cu. ft.
3	9 ft.	65 in.	22 ft.	90 cu. ft.
4	10 ft.	73 in.	23 ft.	120 cu. ft.

The bodies are made of 10-gage sheet steel reinforced with heavy angle iron and they are built to suit the average coal dealer's needs as to capacity. All bodies are short ton capacities, 2000 lbs., water level, giving approximately 10 per cent overload by crowning.



# Buyer's Department of The Commercial Vehicle

## New 5-Ton Federal

**Engine Has 25 Per Cent  
More Power**

INCORPORATING a number of features of advanced design, the new, heavy duty, 5 to 6-ton rated capacity truck herewith described is just about ready to be put on the market. The truck is distinguished throughout by oversize parts and particularly by a powerplant which is 25 per cent more powerful than the units in the former 5-ton truck put out by this concern, the Federal Motor Truck Co. of Detroit.

As compared with the old 5-ton Federal truck, the new unit has a larger engine, with a displacement of 425 cu. in., as compared with 350 cu. in. on the former model. It has a removable cylinder head in place of the fixed cylinder head, larger crankshaft bearings, a full pressure oiling feed instead of circulating splash, electric lights and horn in place of oil lamps and a hand horn, and provision for electric starter, should same be desired. It has a 14 in. clutch in place of a 12 in., larger diameter propeller shaft, a heavier frame, a heavier duty transmission, with a reduced reduction in the rear axles and increased reduction in the transmission, thereby attaining greater speeds in high gear without sacrifice of power in the lower gears. The new truck is also better fitted from the standpoint of equipment, being provided with four towing hooks, vacuum feed in place of gravity and a hubodometer as standard equipment.

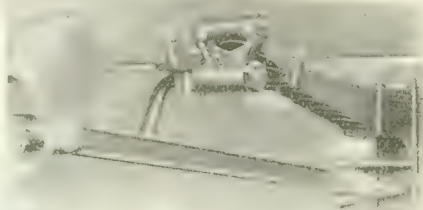
The engine used is the first production of a new Continental model. It has been designed particularly for severe and heavy work, being a four-cylinder;  $4\frac{1}{4}$  by 6 in. design, developing 50 hp. at 1100 r.p.m. The S. A. E. rating with this bore is 36.2 hp.

The cylinders are cast in pairs with removable heads. One of the features of the cylinder castings are the exceptionally large waterjackets which are even noticeable from the exterior of the cylinders, giving a rather fully rounded casting. The crankcase is of heavy construction as far as rigidity is concerned, but of light weight, being aluminum with an aluminum oil pan bolted to it. The flywheel housing is cast integrally with the crankcase and oil pan.

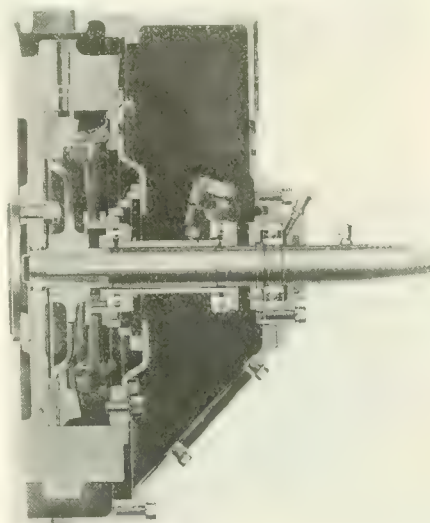
This is a three-bearing crankshaft engine, the crankshaft being  $2\frac{5}{8}$  in. in diameter with heavy webbing. The end-thrust of the crankshaft is taken on the front bearing to allow for unequal expan-

sion between the shaft and the crankcase, and also provides an adjustment for end play. The reciprocating parts are completely machined for balance, both the pistons and connecting rods being of extra length to reduce side thrust. Each piston is equipped with four  $\frac{1}{4}$  in. piston rings.

The gear train at the front end of the engine consists of four gears instead of the conventional three. The use of the idler gear between the cam and pump gears and the crank gear makes it possible to distribute the location of the accessories such as the pump, generator, magneto, etc., so that they may be accessibly installed. Three bearings are also employed for the camshaft, which is



*Radius rod and rear spring assembly, showing ball joint at rear end of radius rod*



*Section through dry-plate clutch and Alemite lubrication attachment*

$1\frac{1}{4}$  in. in diameter between the cams. It is machined and ground on special machines and the diameter of the camshaft at the bearing is greater than the height of the cam, to permit the removal of the shaft without disturbing the bearings. Complete enclosure is afforded

### FEDERAL SPECIFICATIONS

Capacity, tons.....	5
Wheelbase, in.....	163 or 187
Tires, front, solid.....	36 x 6
Tires, rear, dual, solid.....	40 x 6
Bore, in.....	$4\frac{1}{4}$
Stroke, in.....	6
N. A. C. C. hp.....	36.2
Final drive.....	Worm

the valves by removable plates. The valves are on the right side of the engine and are  $2\frac{1}{32}$  in. in diameter. The valve stem diameter is  $\frac{7}{16}$  in. Hand hole plates are provided to simplify the adjustment of the push rods and make the valves themselves more accessible.

Cooling is provided for by centrifugal water pump and the mounting of the pump is so arranged that there is ample room for taking up and replacing of worn packings. The pump is on the left side of the engine on the water pump and magneto shaft, which are driven off the same gear that supplies the drive to the fan pulley.

Full pressure feed oiling is secured by a geared pump. The pump is driven by spiral gears from the camshaft and the thrust on the pump shaft is taken by suitable shoulders against a bronze bushing carried in the crankcase.

The oil pump is primed automatically and draws oil through a strainer in the oil pan. From this pump oil leads run to all the main bearings and the timing gear case. The crankshaft is drilled to supply oil to the connecting rod bearings and an oil duct carries the oil from the lower end of the connecting rod to the piston pin bearing at the upper end.

An oil pressure adjusting valve is built into the engine, and the oil level in the oil pan is determined by the use of the conventional bayonet or stick-type of gage. A pressure gage located on the dash of the truck indicates the pressure under which the oil is circulating. The oil that feeds the pump is strained by a non-clogging type of strainer which is carried in the oil pan. An oil sump is cast in the oil pan at the lower part of the engine, which makes the draining of old or dirty oil from the engine an easy operation.

The gasoline feed system comprises a pressed steel tank of welded construction. The tank has only two pieces electrically welded together and tinned to make it rustproof. It rests in a malleable iron saddle held by straps. Gasoline is fed from this to the engine by means of the Stewart vacuum system, the carburetor is a Zenith, model L-6,  $1\frac{1}{2}$  in. size.

Ignition is provided by an Eisemann, high-tension, model G-4 magneto. The magneto is mounted on a bracket cast integrally with the crankcase and is driven by the pump shaft. The patented



## Buyer's Department of The Commercial Vehicle

Eisemann impulse starter is fitted as stock equipment.

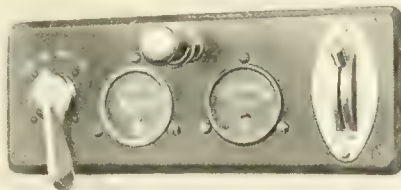
One of the features of the engine is the three-point suspension, two of the points being at the rear and one at the front end. The front end of the engine is supported by a circular trunnion cast integrally with the timing gear case and resting in a saddle, which is bolted to a cross-member. This cross-member is of pressed steel section which is riveted to the side members of the frame at the forward end of the chassis. The two rear engine hangers are cast integrally with the crankcase and are supported on brackets riveted to the frame side members. One of these rear hangers is bolted securely to the bracket on which it rests, and the other is flexibly mounted by means of a high-tension spiral spring used in connection with the hanger bolt. From this it will be noted that the engine is rendered practically independent of frame distortion.

The governor is the Pharo, which is a centrifugal device with an oil inertia medium. The action raises and lowers a piston, which opens and closes a butterfly valve in the intake pipe.

A specially designed Borg & Beck clutch of the single dry-plate type, similar to the clutch used on all of the Federal trucks, is employed. On this truck the driving disks are 14 in. in diameter. The clutch shaft is  $1\frac{3}{4}$  in. in diameter and is milled with ten splines, giving the extra strength required to transmit the torque developed by this engine. The throw-out thrust is taken by a special ball thrust bearing designed for this purpose. The clutch shaft is mounted on two ball bearings and the lubrication of these bearings and the throw-out sleeve is provided for by a drilled clutch shaft through which grease is forced to the different points on the clutch shaft.

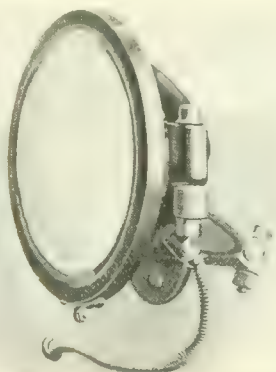
Four speed ratios are provided in the transmission gearset and one reverse. These ratios are of four speed, or high,

1 to 1; third speed, 1.75 to 1; second speed, 3.22 to 1; first speed, 5.85 to 1, and reverse, 6.8 to 1. The gearset is mounted amidship and suspended at



*Instrument board on new Federal 5-tonner*

three points, two in the rear and one at the front. The front support is flexible and the two rear supports are bolted securely to a frame cross-member. This three-point suspension relieves the gearset of stresses due to frame distortion. The gearset housing is of rugged construction, being reinforced by webs and



*Type of electric light supplied as stock equipment on Federal*

in addition has very heavy walls. The gears are drop-forged of chrome nickel steel. There is an opening on the side of the transmission case, through which, by removing a plug, the transmission

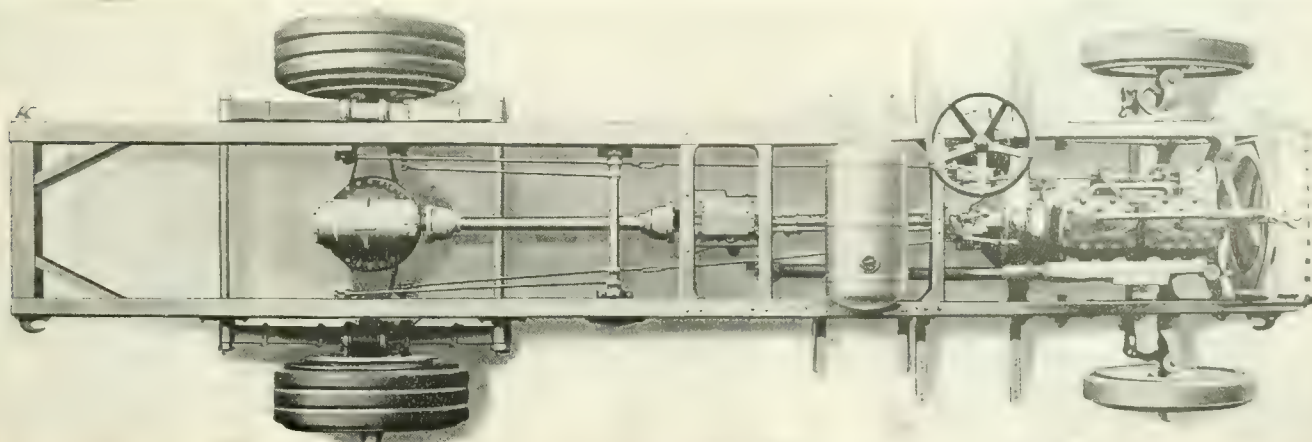
may be filled with oil. This is a distinctive feature on the Federal truck.

A power take-off for use in coupling up a hoist or winch or any other mechanical auxiliary is provided by the removal of plates on either side of the case. Two propeller shafts are necessitated by the use of the amidship transmission, one between the clutch and the transmission and the other between the transmission and the rear axle. On this new truck each of these carries two universals. The shafts are tubular with forged stubs electrically welded to each end to which the universal joints are attached.

Pressed steel channel with a section 9 in. deep by  $9/32$  in. thick is employed for the frame. It is reinforced at all corners and at the junction of the frame cross-members is provided with heavy gusset plates. The frames are hot-riveted and all the rivet holes are drilled and not punched. The truck is made in three chassis lengths with wheelbases of 163 in. on two of them and 187 on the third. The two with the 163 in. wheelbase have loading spaces respectively of 130 in. and 154 in. The 187 in. wheelbase chassis has 190 in. loading space. These trucks all have the same overall length of the frame, 222 in.

Gemmer steering of worm and worm wheel construction is employed and the control levers for the spark and throttle are mounted on the steering post. The steering gear, clutch pedal and service brake pedal are on the left side. The gear shift lever and the emergency brake lever are mounted in the center.

In the way of electrical equipment, the 5 to 6-ton model is equipped with an electric generator, 6-volt battery, two electric side lamps with diffusing lenses and electric tail lamp. A feature of the equipment is the mounting of the tail lamp in a recess in the rear frame and of the license plate on the rear frame in such a way that it is illuminated by the white light of the tail light and in conformity with the law in several states.



*Plan view of the Federal 5-ton truck with standard units as supplied*

# Buyer's Department of The Commercial Vehicle

## J-E Battery

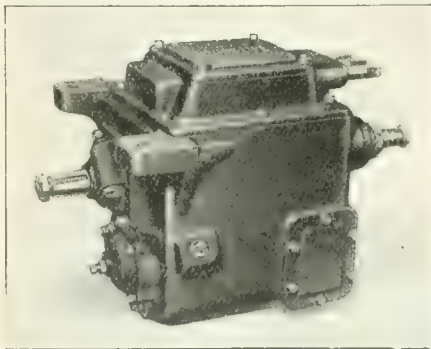
THE J-E battery requires no water nor any refilling. It can be left idle, in storage, for example, in a charged condition, for many months, and when needed will turn over the starter with entire satisfaction. If the battery happens to be discharged, or should become discharged on account of a short circuit in the wiring, it will not injure the battery in any way, according to its makers, the Jelly-Electrolyte Battery Co., 1113 South Broad Street, Philadelphia. The jelly will not disintegrate.

A Philadelphia inventor, Dr. Chas. E. Luburg, saw an advantage in a solid, or semi-solid, form of electrolyte, and in 1913 obtained his first satisfactory results. He was able to turn sulphuric acid into a jelly which would not only absorb and discharge electric current as desired, but would retain it to a surprising degree for a considerable length of time.

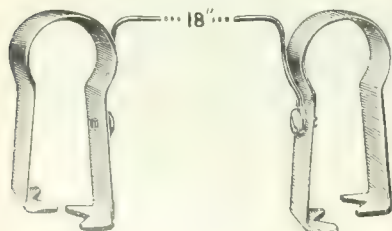
Since then he has decided to make a complete battery filled with his Batri-Jel, as it is called. The executive offices of the company are in the Knickerbocker Bldg., 152 West 42d Street, New York City.

## Pick Universal Joint

MOST metal universal joints now in use comprise a central cross or equivalent part and two forks connecting with the cross or ring at right angles to each other. Thus the power is transmitted from one fork to the cross or ring through two trunnion bearings, and then from the cross or ring to the other fork through the other two trunnion bear-



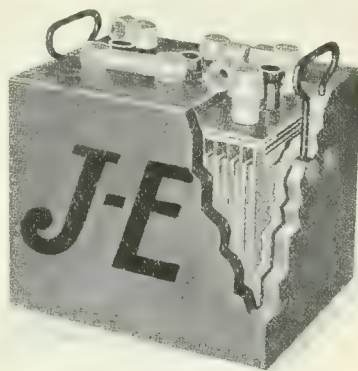
Brown-Lipe transmission



Attacho battery jumper

## Truck Accessories

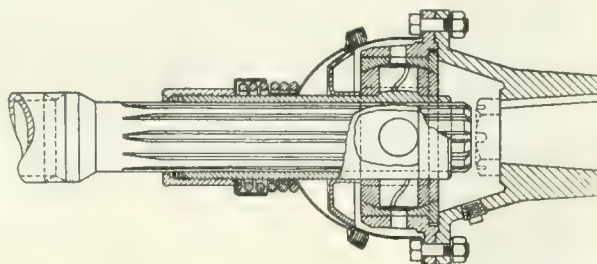
ings. A universal joint in which the power is at all times divided between four trunnion bearings is manufactured by the Carl Pick Co., West Bend, Wis. The bearings in this case are arranged to slide in longitudinal slots in the ring which forms one member of the universal. All major parts are steel forgings, and the bearing surfaces are hardened and ground. The universal is enclosed in a housing composed of three steel stampings which retain the lubricant. It is made in three sizes, of 4½, 5 and 6 in. outside diameter, respectively. These universals are furnished in sets together with tubular propeller shafts. S. A. E. standards are adhered to throughout.



J-E battery

## Attacho Battery Jumper

THE Attacho battery jumper consists of two lead-coated clamps connected by 18 in. of lead-coated copper wire. It is intended primarily for use on batteries fitted with taper terminals. The prices range from 20 cents per jumper set in lots up to ten, down to 10 cents a piece for lots of 1000 or more. The maker is the Mueller Electric Co., 2135 Fairmount Road, Cleveland.



Pick universal joint



Tire jack

## Brown-Lipe Transmission

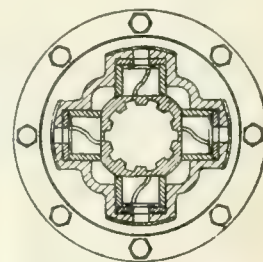
THE Brown-Lipe Gear Co., Syracuse, N. Y., has added another transmission—Model 55. As the new product is designed to fill a gap heretofore left open and has several individual features, the accompanying illustration and description should be of interest.

Model 55 is of the mainframe type and, as its name implies, is substantially midway in capacity between the company's present Models 50 and 60. Regular features are selective gears that give four speeds forward and one in reverse; a rear mainshaft bearing cap that takes a speedometer drive, and two S.A.E. standard pads—one on the right and one on the left side of the case, and respectively intended for a one-speed power takeoff and a pump.

Optional arrangements include either overhead or side shift and, when a power take-off is not used, the mounting of the pump on the right side of the case.

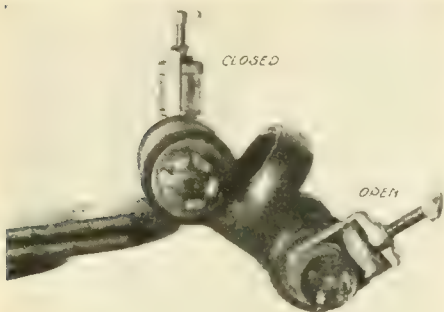
## Tire Jack

AS a tool, the Electric Specialty tire jack is a small flat compact device. The hooks which lift the tire are simply slipped under the tire and the small hook dropped through the hole in the lever. The maker is the G & W Electric Specialty Co., Chicago.





# Buyer's Department of The Commercial Vehicle



Davis grease cup

## Duplex Radius Rod

THE Duplex radius rod is designed to put an end to all steering and radius rod troubles on Ford trucks. This is not an auxiliary radius rod, but a radius rod complete in itself and eliminates the Ford radius rod entirely. It is adjustable in length, thus permitting placing the front axle in its proper pitch and keeping it there under the most severe road conditions. It is stated, it saves the breaking of crankcases and crankcase arms by putting the strain of the front axle on the frame. It is installed without any drilling of holes. It is attached in the rear by the emergency brake bracket bolt and a clamp around the frame. In the front it is attached to the spring perch. The maker is the Walter R. Strunk Garage Co., 318 Moss Street, Reading, Pa.

## Ensign Carbureter

THE new Ensign carbureter model has a manual starting control and a new idling adjustment. While this carbureter, of course, retains the same metering and mixing principles which form the basic principles of all Ensign carbureters, the adjustments are placed on the top of the carbureter, where they are easily accessible and make the installation and adjustment very easy and simple.

The closing of the starting shutter, "pulling out the choke," as it is known to most truck owners, creates a greater speed revolution in the mixing chamber

in direct ratio to the amount the shutter is closed, even at slow engine speeds. Instead of simply cutting off the air supply, the Ensign shutter, by this action, gets a higher velocity of action that tends to more thoroughly break up and atomize the mixture even at starting speeds. The maker is the Ensign Carbureter Co., Los Angeles, Cal.

## Davis Grease Cup

THE leading feature of the Davis grease cup is a spring metal plunger which is slightly concave like a shallow saucer. This exerts a firm, uniform pressure against the sides of the barrel which is claimed to make the cup dust and leak proof as well as oil tight. Both



Pledger fuel saver

oil and grease may be applied with any required pressure. The metal cap is opened and closed each with but one turn, and both the plunger and cap are fastened to the barrel. The maker is the Davis Mfg. Co., 1082 Union Street, San Francisco.

## Pledger Fuel Saver

THE Pledger gas-saving appliance for Fords is operated easily and conveniently by a foot accelerator and becomes effective immediately after the carbureter has ceased its function. This is done by applying heated air to the intake manifold through a special intake valve. The hot air is carried from the hood on the exhaust manifold directly into the valve and from there is injected into the engine, mixing with the

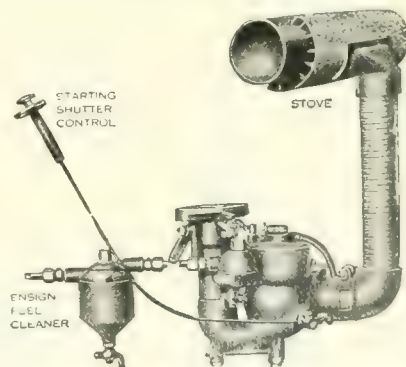
gas in proportions best suited for the various speeds of the engine. It is constructed so that it in no way interferes with the regular throttle drive used on Fords. This appliance, it is stated, effects an increase in mileage per gallon on any Ford of from 30 to 60 per cent. The retail price is \$15. The maker is the Boston Tool & Mfg. Co., Boston.

## Atwater Kent Ignition for Ford

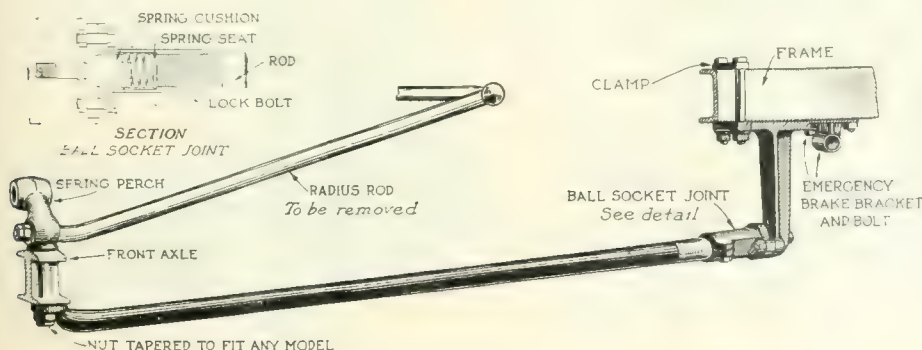
THE new Atwater Kent ignition system with its contact maker and distributor replaces the standard Ford timer. It is mounted on a bracket where it is protected from dirt and oil, and is easily accessible. One of the regular Ford coils is used to supply the high tension current. The price is \$16. The maker is the Atwater Kent Mfg. Co., Philadelphia.

## McQuay-Norris Piston Ring

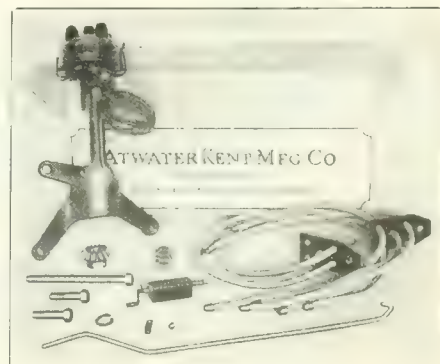
THIS ring is called the Jiffy-Grip and is made to sell at a retail price of 50 cents, excepting in the far West and in Canada. It is a one-piece, concentric ring with a velvet finish that seats quickly and with an improved joint that cannot "butt." These new rings come in standard sizes and oversizes, up to 5 in. in diameter; oversize service from stock in 5, 10, 15, 20, 25 and 31 thousandths. Like all McQuay-Norris rings, the Jiffy-Grip is made of electric iron, which is melted and refined at the furnace of the McQuay-Norris Mfg. Co., St. Louis, Mo.



Ensign carbureter



Duplex radius rod



Atwater Kent Ford ignition

# Buyer's Department of The Commercial Vehicle

## Storm Reboring Machine

THE Storm "Type M" Reboring Machine, which is now being offered to the trade possesses a number of unique features and advantages, making it admirably adapted to the needs of shops doing cylinder reboring of all kinds.

The main body is a one-piece, heavy casting and supports the boring bar, feeding and driving mechanism. The construction provides two heavy, adjustable bearings in which the boring bar operates.

The boring bar is of hollow, carbon steel, hardened and ground, and having a travel of 14 in. It is actuated by means of cut spiral gears and the feed is obtained through heavy, internal screw and upper feed gear, as shown. The bar supports the cutter heads, which are not shown.

The cutter heads are of the Storm patented six cutter type, which have universal adjustment by means of a center cutter adjuster, so that they cut to any desired size within the capacity of the machine.

The machine is supported by heavy base provided with clamp yoke and clamping device. It rides or floats free in this clamp and is self-centering. A valuable feature of this tool is its adaptability to do different methods of drive. It is regularly furnished with a connection for drill press but can also be furnished with pulley for belt or for motor drive. It will be noted that the machine does not set directly in front of or over

## Shop Equipment

the drill press spindle but instead sets to one side so that it does not interfere with the use of the drill press for other work. Furthermore, it is back geared so that it may be used in connection with any ordinary 20 in. drill press.

On other types, where the boring bar is driven directly from drill press spindle, a back geared drill press only could be used, otherwise proper speed could not be obtained. Then too, the combined height of the block and machine does not interfere with its use under any ordinary drill press.

Each machine is also provided with double end wrench for operating by hand

so that it may be removed from the base and used as illustrated for reboring motors without removing them from the chassis, by merely withdrawing two small pins in the clamping device.

The total capacity of the machine is from 2½ in. to 6½ in., and it weighs approximately 300 lbs. Prices range from \$285 to \$350, according to size.

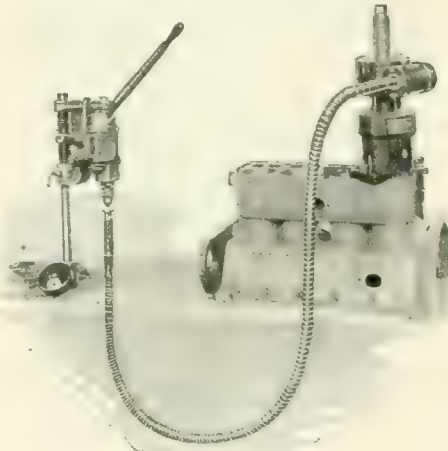
It is manufactured by the Storm Mfg. Co., Minneapolis, Minn.

## C-O Piston Clamp

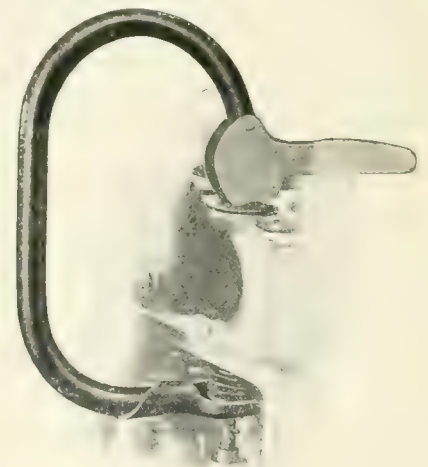
THE C-O piston clamp is adapted for holding pistons during the process of disassembling and reassembling the connecting rods to them. It is also used for holding the pistons while reaming bushings for wristpins. The clamp is lined with babbitt, therefore it will not injure the pistons or rings. It will take pistons up to 5 in. The net weight is 9 lb. The list price is \$6.85. The maker is the Canedy-Otto Mfg. Co., Chicago Heights, Ill.

## York Cylinder Reboring Tool

THE York cylinder reboring tool takes care of reboring work from 2½ up to 5 in. It is regularly furnished for manual operation, but an attachment for



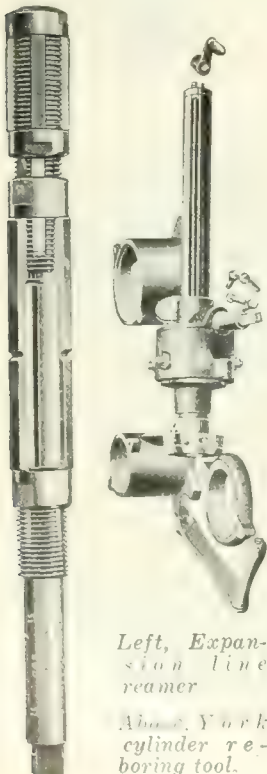
Universal power drive



Valve Lifter



C-O Piston Clamp



Left, Expansion line reamer

Also, York cylinder reboring tool.



Storm reboring machine



# Buyer's Department of The Commercial Vehicle

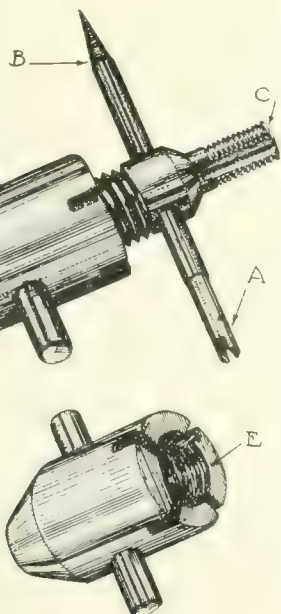
using power from an electric drill is furnished. The complete tool is furnished in a neat cabinet. This size is known as No. 1 and sells for \$225. Other sizes and prices are as follows: No. 2, 3 $\frac{3}{4}$  to 5 in.,—\$170; No. 3, 3 to 4 $\frac{1}{2}$  in., \$170; No. 4, 2 $\frac{1}{2}$  to 3 $\frac{3}{4}$  in., \$165; No. 5, Ford size, \$155; No. 6, Ford and Fordson size, \$160; No. 7, Dodge size, \$162; power drive attachment without motor, \$35. The maker is the Flinchbaugh Machine Co., York, Pa.

## Valve Spring Compressor

**R**EMOVING and replacing the valve springs on all types of valve-in-head engines is the purpose of the C & S valve spring compressor manufactured by Culavin & Smith, Dunlap, Iowa. The operation is simple. The bracket is fastened to the top of the work bench about 1 ft. from the edge by means of two wood screws or small bolts. The lever is adjusted to the desired height on the upright by means of the clamp. The opening of the fork is so constructed that any kind of retaining key or lock can pass through it. The price is \$2.50.

## Valve Lifter

**T**HIS is a cam-operated valve lifter. In order to use it the head and side plates are removed, but the tool fits around the carburetor and the manifold. The tool is made of cold-rolled steel. The one illustrated is for the Ford engine. Other models are manufactured for many of the popular makes of vehicles. The price is \$1.50. The maker is the Loomis-Beardsley Mfg. Co., Columbus, Ohio.



5-in-1 tire valve tool

## Expansion Line Reamers

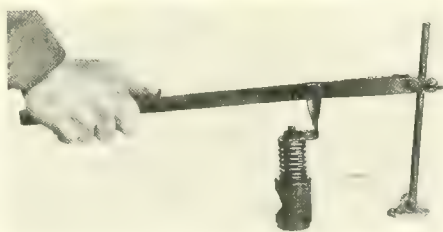
**T**HESE tools are similar to the Critchley type of reamer sold by this company with the addition of an expansion pilot for reaming two holes in exact alignment. The pilot and reamer blades are proportioned to give the maximum range within the capacity of each size. Each size has a range of 1/16 in. The range of capacity of the various sizes is from 19/32 up to 1 7/32 in. The prices range from \$8 to \$15. The maker is the P. & G. Tool Co., 36 Oliver Street, Boston.

## 5-in-1 Tire Valve Tool

**T**HIS tire valve tool is intended for the use of service station employees. It is useful in that every conceivable operation on a tire valve can be performed



Casey-Hudson door control



Valve spring compressor

with it. In all there are five working ends, shown by the letters A, B, C, D and E in the illustration. When moving a valve core the inside threads of the stem first are cleaned up by the tap C, after which the core can be removed with slotted end A. It sometimes happens that the tangs are twisted off the core and when this occurs the core can be removed with the end B.

This is a tapered

left-hand screw. The fourth working end of the tool is D, or the pulling end. Often the little spring and wire is stuck in the valve stem and the hole in the latter is so small that no pliers or tweezers can be inserted. By placing the chuck end of the tool, or D, into the hole and tightening up on the handle the wire can be withdrawn. The chuck end of the tool is self-centering and thus locates the wire automatically. The fifth working end is E, a die for smoothing up the outside threads of the stem. The tool sells for \$1 and is made by the H. C. Gielow Co., 60 W. Washington Street, Chicago.

## Universal Power Drive

**T**HE Universal power drive which is shown attached to the Universal cylinder reboring tool can be operated by the bench or floor type of drill press. It can be used with all models of the 1/2 in. portable electric or air drills or with the improved Universal cylinder reboring tool. It is manufactured by the Universal Tool Co., Detroit.

## Casey-Hudson Door Control

**T**HIS device, which electrically controls single or double swinging, sliding or folding doors or gates, is manufactured by the Casey-Hudson Co., 357-361 East Ohio Street, Chicago. It consists of a small motor, with the necessary fittings which is installed above or at the side of the gate or door and actuated by the pressure of control buttons placed at a distance, to open or close it. It can be used with either direct or alternating current.

## Bet-R-Bilt Wrench Set

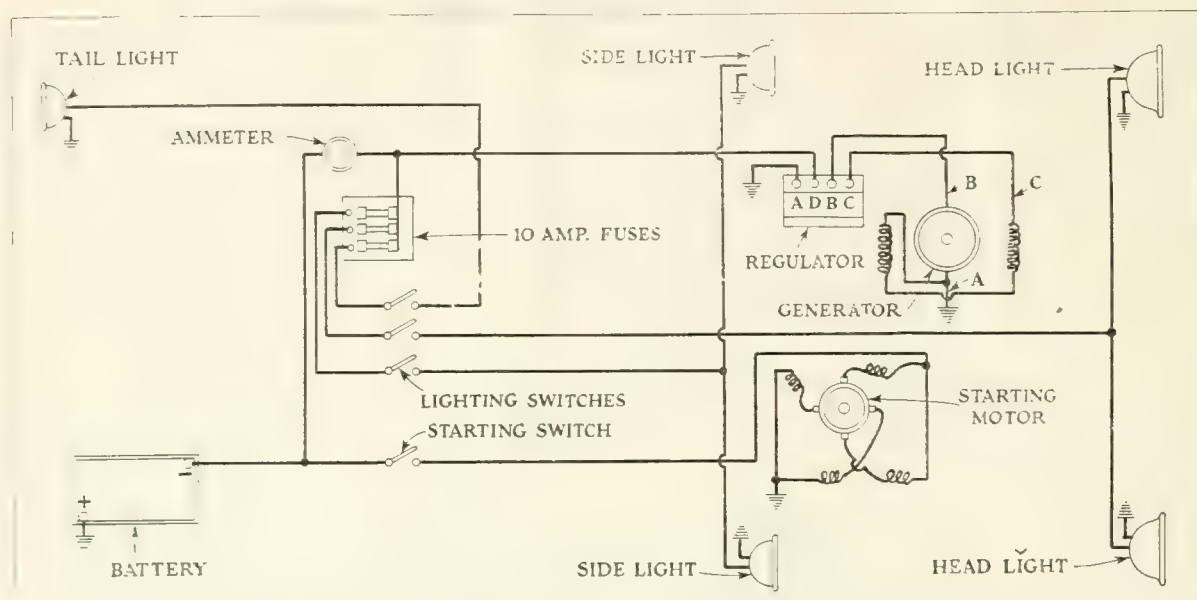
**O**NE HUNDRED AND TWENTY-FIVE combinations may be had with the No. 1 set of Bet-R-Bilt socket wrenches, selling at \$7.50. Various lengths of shaft or leverage can be obtained with either a T, offset or L handle. The maker is the Robinson Equipment Co., Boston.



Bet-R-Bilt wrench set

# Motor Truck Electric System Wiring Diagrams

## 20—Starting and Lighting Unit on Kelly-Springfield Trucks



*One-wire Robbins & Myers starting and lighting system with Ward Leonard controller, as applied to the Kelly-Springfield trucks*

### *These Diagrams Are Valuable —Save Them*

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE.

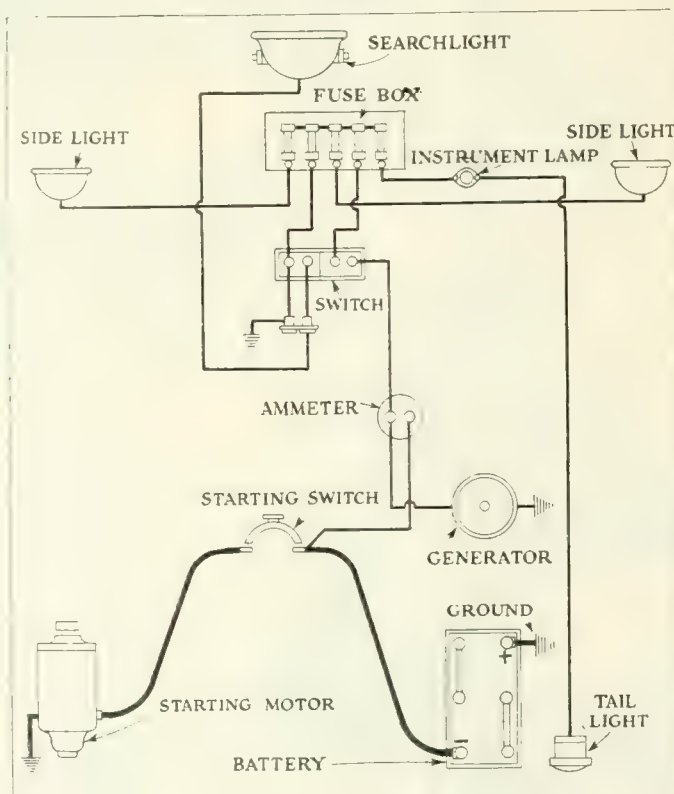
1920

- 1—Ford, Starting and Lighting..... Oct. 1
- 2—Acme, Lighting .....Oct. 15
- 3—Bethlehem, Starting and Lighting.....Oct. 15
- 4—Atterbury, Lighting.....Nov. 1
- 5—Ace, Starting and Lighting.....Nov. 1
- 6—Atlas, Starting and Lighting.....Nov. 15
- 7—Briscoe, Starting and Lighting.....Nov. 15
- 8—Defiance, Starting and Lighting.....Dec. 1
- 9—Commerce, Starting and Lighting.....Dec. 1
- 10—Grant, Starting and Lighting.....Dec. 15
- 11—Brockway, Starting.....Dec. 15

1921

- 12—Maxwell, Lighting.....Jan. 15
- 13—International, Starting and Lighting.....Feb. 1
- 14—Mack, Starting and Lighting.....Feb. 15
- 15—Vim, Starting and Lighting.....Mar. 1
- 16—Oldsmobile, Starting and Lighting.....Mar. 15
- 17—Feo, Starting and Lighting.....Apr. 1
- 18—Sterling, Starting and Lighting.....Apr. 15
- 19—Stewart, Starting and Lighting.....May 1
- 20—Kelly-Springfield, Starting and Lighting.....May 15
- 21—Riker, Starting and Lighting.....May 15
- 22—U. S. Starting and Lighting.....Next Issue
- 23—Wilcox, Lighting.....Next Issue

## 21—Starting and Lighting Unit on Riker Trucks



*Riker wiring diagram on 3 and 4-ton trucks, used when searchlight is installed*





### Wants Information on Class B Liberty Truck

To the Editor, COMMERCIAL VEHICLE:

Who is the maker of the clutch used in the U. S. A. Class B Liberty truck? How can one make the clutch brake more effective on this clutch, assuming that the facing is O.K. and that I have taken up the clutch throw out adjustment?—R. L. AMSPACHER, York, Pa.

Some of these clutches were made by the Detroit Gear & Machine Co., Detroit. The clutch brake becomes more effective the harder you press on the clutch pedal. There is no way of adjusting the brake.

### Wants Catalog of 1916 3-Ton Vulcan Truck

To the Editor, COMMERCIAL VEHICLE:

Who are the makers of the 3-ton American Vulcan chassis delivered into this country during 1916? We would appreciate your sending us a catalog describing this truck. We have also heard that the maker of this vehicle was the Driggs-Seabury Ordnance Co.—A. L. KNOX, British Commercial Lorry & Engineering Co., Ltd., Manchester, England.

Your truck was made by the Driggs-Seabury Ordnance Co., Sharon, Pa., taken over by the Savage Arms Corp., about 18 months ago. That company discontinued the manufacture of these trucks a little over 4 years ago and will be impossible to supply you with a catalog.

### Toledo Freight Depot Arranges for Return Loads

To the Editor, COMMERCIAL VEHICLE:

I would like to know when the Toledo freight depot was organized and whether the organization arranges for return loads.—READER.

The Hi-Ways Freight Station Co., an outgrowth of the Hi-Ways Transport Association, was organized in 1919, and includes the leading cartage and warehouse men of Toledo. This company maintains for the mutual benefit of truck-owning members and those whom it serves, a central office and a secretary-manager. In this office an accurate check of trucks is kept on a large blackboard. The moment a member has a truck not in use he notifies the secretary and the truck is immediately posted as idle. Another member, whose trucks are all in operation, may receive a request from a shipper. He notifies the secretary of this request and the idle truck belonging to the first member is placed in service.

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

In the inter-city hauling, trucks are operated so systematically that they are assured of cargoes both ways. Rate schedules are based on the cost-plus plan and the association provides for members a course of instruction which teaches the proper way to determine expense of operation.

All cargoes are insured by the association from the time they are placed aboard the truck at the shipper's place of business until they are delivered at their destination.

The freight station has two floors and a basement and 10,000 sq. ft. of storage space.

### Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

Make use of it.

The editors will be glad to answer any questions which you ask.

### Answers

### Reader Wants System for Arriving at Ton-Mile

To the Editor, COMMERCIAL VEHICLE:

Will you kindly give me a chart or other system for arriving at ton-mile?—E. L. DOOLAY, Cranbrook, B. C.

If the use of a cost keeping system is contemplated, the ton-mile may be arrived at by dividing the total miles covered in a period by the total number of trips made; the result is the average miles per trip. Then the total tons is divided by the total trips made; this gives the average tons per trip. If the average miles per trip is then multiplied by the average tons per trip and the result divided by 2, it will give the average commercial ton-miles per trip. Multiplying this figure by the total number of trips made during the period will give the total commercial ton-mileage.

### Reader Prefers a Governor Driven from Gearset

To the Editor, COMMERCIAL VEHICLE:

Did your engineers ever stop to consider how impractical it is to have a governor on the truck driven from some part of the engine? Why not publish this fact after trying it yourself for the benefit of truck owners?

A governor driven from the gearset permits the speed of the truck to be operated independently of the engine speed. For instance, your truck is governed to 14 m.p.h. and the truck is stalled. You have an engine-driven governor which is arresting the reserve engine power. With a governor driven by the gearset, the gearset being an independent unit or a unit with the engine, it is then possible to get all of the power the engine is able to produce and at the same time have the speed governed according to the desired requirements.—R. E. RUDOLPH, Buffalo, N. Y.

### Standardization of Motor Truck Body Dimensions

To the Editor, COMMERCIAL VEHICLE:

I would appreciate any information that you might give me on what is being done toward the standardization of motor truck body dimensions to permit interchangeability of bodies on the chassis.—F. S., Detroit.

The Truck Division of the Society of Automotive Engineers has been considering for some time the possibility of this standardization. A tentative subdivision report was submitted at the meeting of the Truck Division on March 15 which specified definite chassis dimensions for truck capacities from  $\frac{3}{4}$  to 6 tons for the length back of the seat to the end of the frame, the length back of the seat to the center line of the rear axle, and the frame width. Body dimensions specified are the location of the cross sills allowing for a permissible variation of plus or minus  $2\frac{1}{2}$  in. of the length back of the seat to the center line of the rear axle with a 1-in. radial clearance between the tire and the corner of the sill and the spacing dimensions for the cross sills resting on the frame. Dimensions for the frame height from the ground with the truck loaded, the body cross sills, the spring travel, the tire diameter, the wheelbase and the distance from top of the frame to the bottom of the body are given in the report, but are not submitted for standardization.







May 15, 1920, pages 260 and 261. This article treats of the two-story garage owned by the Wheat Ice Cream Co., Buffalo, N. Y. This garage was built with the future expansion of the company's business in view, for while it is now used to garage only sixteen trucks and thirteen passenger cars used by the salesmen, it has a total capacity of twenty-six passenger cars and thirty-five motor trucks. A 20-ton elevator is installed to move the heavy trucks from the first to the second floors.

May 1, 1920, pages 220 and 221. This article deals with the garage of Barker Bros., a leading furniture concern in Los Angeles, Cal., and takes up particularly the washing facilities. The garage is only one story in height, so that no ramp or elevator is required.

April 15, 1920, pages 209 and 210. This article presents the plans for two proposed garages, one a one-story garage for storing twelve trucks, four touring cars and fifteen runabouts, and the other a two-story building to take care of thirty-one trucks, four touring cars and twenty-seven runabouts. A ramp with a 20 per cent grade is indicated in the plans published, which also include a complete shop and service station.

Dec. 15, 1919, page 410. This article shows how the Shults Bread Co. has laid out its shop work at its service station in Hoboken, N. J. The plan of the service station floor with the location of the equipment of the five different departments into which the truck work is divided is shown.

July 1, 1919, pages 16 to 21, gives a description of the modern garage of the Horton Ice Cream Co., New York City. The building is of two stories and a ramp is used to move the trucks from the main garage on the ground floor to the repair shop on the second floor.

June 1, 1919, pages 16 to 19. In this article is given a description of the combination repair shop and garage of the Motor Haulage Co., New York City, in which a fleet of forty-seven 5-ton Pierce-Arrow trucks is maintained.

Effect of Grades on Drawbar Load of Tractors

To the Editor, COMMERCIAL VEHICLE:

Kindly give a formula for figuring the drawbar pounds necessary for pulling different weights of tractors and loads up various grades, as for example:

Given a 20 per cent grade,  
a 4-ton tractor and  
a 3200-lb. drawbar pull,  
how many pounds will the tractor pull up the given grade?—W. ANDREASON, Franklin, Pa.

Of the above factors only the drawbar pull developed by the tractor on the 20 per cent grade and the grade itself are useful, for the weight of the tractor under these conditions will not affect matters.

The drawbar pull required per ton of gross trailing load will depend upon the sort of road encountered. On an average hard country road it may be as little as 70 lb. On a muddy road it may be

100 lb., and on a hard, smooth macadam road as low as 50 lb.

The grade affects the draft in two ways. The lifting component of the effort required to pull the trailer will be proportional to the grade in per cent. On a 100 per cent grade it will be 2000 lb. per ton. On the level it will be 0. In addition to this there is the gravity factor, which is equal, roughly, according to test data, to about 7 lb. per cent of gradient. Thus we derive the following formula:

X + 27G = D

When X is the drawbar pull in pounds per ton on the level,

G is the gradient in percentage, and  
D is the resultant drawbar pull in pounds per ton required on gradient G.



Service on Parts!

It is your right—  
To demand the following:

- 1—Quality, trade-marked truck spare parts.
- 2—Prompt and unfailing merchandising and delivery of parts.
- 3—Reasonable prices on parts, which shall be uniform to all.
- 4—Parts price lists on file in the owner's office and in the office where he buys parts.

It Will Mean Better Business All Round



Applying this formula to the case you cite and substituting in the formula we have:

X = 150 (or any other factor to fit conditions)

G = 20

Then 150 + 27 × 20 = 150 + 540 = 690 lb. per ton.

Since you have 3200 lb., then 3200 ÷ 690 = 4.76 tons which can be drawn by your tractor.

Figuring Depreciation of Tires and Trucks

To the Editor, COMMERCIAL VEHICLE:

On what basis is the depreciation of tires figured and what would be a fair basis to figure depreciation of a truck? —A. WELCH, Chicago.

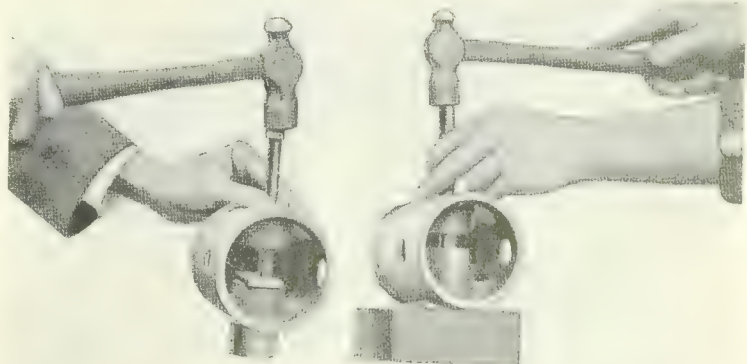
Perhaps the best method of figuring tire depreciation is on the basis of the cost per mile. Divide the original cost of the tire by the number of miles which it is guaranteed to run. This will give you the unit cost per mile. If your truck runs 100 miles a day, the charge for tires would be 100 times the unit cost per mile. If the tire gives more than the guaranteed mileage it is usual to consider the additional mileage as an extra saving which is not calculated in the cost records, but rather to draw upon in case the tire which runs less than the guaranteed mileage is not adjusted satisfactorily.

In ordinary work the usual plan in figuring truck depreciation is on the basis of a life of 5 years. This would make the owner charge off a depreciation of one-fifth of the original cost each year. At the end of the 5 years he would thus have enough money to buy a new truck from that which has been laid aside during the 5-year period. While the truck depreciates less in the first and second years than it does in the third, fourth and fifth years, it is usual to make the depreciation equal over the 5-year period, as this saves considerable bookkeeping and other clerical work.

Some owners whose trucks are engaged in especially arduous service depreciate their vehicles at the rate of 33 1/3 per cent a year. The conditions under which your trucks are operating will enable you to judge for yourself whether they will last for 3 or 5 years.

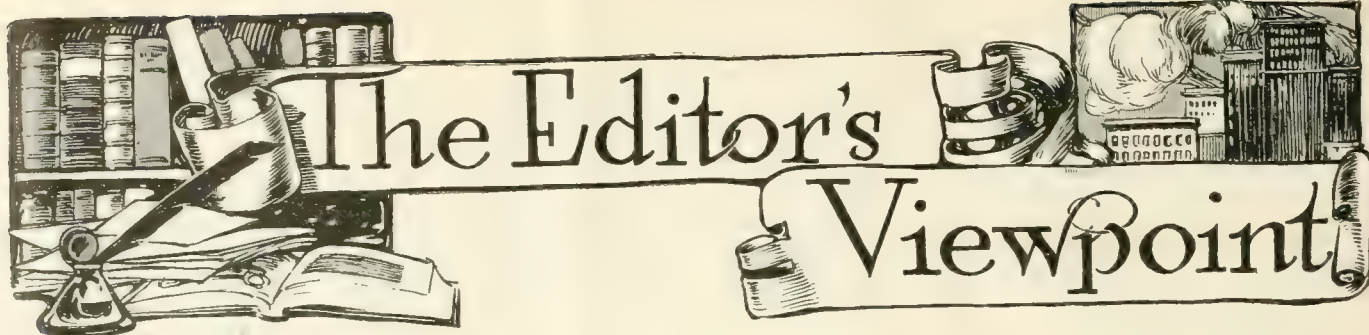
Another method is to charge off the depreciation at so much per mile, assuming that the truck has a life of from 100,000 to 150,000 miles.

One company bases its depreciation at 2 years. When its repair bills after the 2-year period have equalled the original price of the truck, then the company figures it is time to junk the truck and purchase a new one.



Replacing of piston pin bushings in Waukesha truck engine





## We Want Truck Terminals!

IT is not to be expected that the motor trucking industry can reach maximum efficiency, so long as the solicitation of business is in the hands of a multitude of individual operators. For this means a big duplication of effort.

The motor truck terminal will avoid this duplication. And in doing so it will go far to stabilize the industry.

A major advantage of the truck terminal is the fact that the shipper dealing with such a terminal will hold the receipt of a responsible company, the terminal company, for its goods. The individual operator may or may not be a responsible party. The fact that he sometimes is not has tended in the past to limit the amount of freight available for truck haulage companies. The trucking terminal will be an incorporation with sufficient tangible assets to make its receipt respected by the shipper.

The terminal company will require cargo insurance to be carried by commercial haulers operating out of the terminal—and insurance will be carried by the terminal, in cases where it operates its own trucks. In dealing with individual operators in the past, the shipper either had to take a chance, or else hunt up the more or less rare operators who carry insurance. The shipper's unwillingness to do either has been a big factor in limiting the tonnage available to the commercial hauling industry.

The terminal companies will have bonded employees to handle C.O.D. shipments. There are many shipments on which the consignee would like to have quicker delivery than is possible by rail, express or parcel post. But he must content himself with the slower delivery because he is a C.O.D. account and the shipper is not in touch with a responsible hauler whom he can trust to make collection.

A terminal company will be responsible for the action of the commercial haulers operating out of it. So it cannot afford to do business with those who do not keep accurate and adequate records. So, when delivering his goods to a terminal, the shipper will be assured that they will be transported in the charge of an efficient and reliable person. This will tend to increase business.

It may not always be possible at the beginning to maintain scheduled routes. But it is reasonable to suppose that the other advantages offered will attract a volume of business sufficient to maintain scheduled routes much sooner than if the business

were handled by individual motor truck operators.

Another advantage to both shipper and consignee is 24-hour deliveries. This will enable the retailer to reduce stock and increase turnover.

The terminal offers a known and accessible place at which to deliver freight. Many shippers will not give their business to the individual commercial hauler because it means increased congestion at their own shipping platforms.

The terminal company will publish a tariff. This enables the shipper to tell at a glance what service he may promise a customer; where he should be able successfully to compete for new customers; where and when truck transportation is the most economical, cost and service considered.

So much for the advantages of terminals to the shipper. But not the least of the advantages the terminal offers the operator is the increased tonnage made available by the confidence of the shippers in a more tangible organization.

But in addition, the terminal will solicit business, as a part of its service to the operator. Obtaining his loads through a terminal, the individual operator does not have to spend valuable time soliciting business. The terminal, efficiently operated, has proved itself the best solution of the return loads problem.

In addition, the terminal relieves the individual operator of adjusting claims and making collections. And by planning and maintaining routes, the terminal will do its operators another great service.

The terminal will enable the individual operator materially to reduce his operating costs by taking on a full load at a single point of origin.

Lastly, the terminal will maintain freight handlers. This is not only economical from a labor standpoint, freight handlers usually being cheaper labor than truck drivers, but it means that the freight is sorted and waiting and that the truck is loaded with a minimum of delay.

Altogether, truck terminals will not only go far toward stabilizing the industry, but will be of immense value to truck operators in other ways. If we want them, let's get together and go after them. For if we want them badly enough we will get them. And until reliable motor truck terminals are established all over the United States, the motor truck haulage industry will be handicapped by lack of organization, lack of co-operation, and by loose, inefficient and mutually obstructive methods.



## Annul Nebraska Truck Haulage Rates

### Railway Commission Believes Time Not Ripe for Regulation—No Co-operation

LINCOLN, NEB., May 2—The Nebraska State Railway Commission has rescinded and annulled its orders which in 1919 established rates for common carriers by trucks on the highways of Nebraska.

These rules, regulations, classifications and tariffs were for the transport of freight and express, and the Commission announces that the cancellation now is ordered "without prejudice to again opening the matter when need shall arise," and that meanwhile:

"The Commission still has a considerable number of copies of the classification and rate basis which will be available gratis to any who desire the benefit of the studies made to the end that financially ruinous practices may be avoided."

The significance of the Commission's cancellation order is that the Commission believes the time is not ripe for State regulation of this class of business. The Commission says:

"The time might soon arrive when the inter-town business will be concentrated in the hands of a few concerns and it is possible under these circumstances for combinations and aggressions to be made which would be seriously disadvantageous to the public, but that time is not here now.

"The lack of regulation has its chief menace for those who are putting their money into the business, but in the length of time the Commission has attempted to stabilize the business, not only in the interests of those who risk their capital but in the development of an important arm of transportation service, there has been such a lack of co-operation on the part of those concerns as to warrant giving no further consideration to that phase of the matter."

The Nebraska Street Railway Commission on July 1, 1919, established motor trucking rates per 100-lb. of goods between points not within the same city or village. The rates seemed fair and were based upon a charge of 1½ cents per mile for 100 lb., plus a fixed charge of 15 cents per 100 lb., to include both the handling at the point of receipt and for distribution at destination. Thus the rate for first-class goods per 100 lb. moved a distance of 1 mile was 16½ cents, and for 100 miles \$1.65.

The rates applied only to truck owners who transported freight for hire upon the public highway between points located in the eastern portion of Nebraska. Following the method of railroad classification, goods which might be hauled by trucks were classified under four different heads and designated as first, second, third and fourth-class.

The second-class matter was to be carried at 85 per cent of the first-class rate; third-class goods at 70 per cent of the first-class rate, and fourth-class goods at 60 per cent of first-class rate.

The rates per 100 lb. were determined upon the basis of using a 2-ton truck, which was the size most generally used in that State, due to the fact that the roads and their condition were during certain portions of the year unsuited for uninterrupted use of 5-ton trucks, such as are most usually employed for intercity traffic over the more improved highways in the East.

A complete list of the rates, etc., appeared in the Aug. 15, 1919, issue of THE COMMERCIAL VEHICLE.

### Win Compromise License Bill

PHILADELPHIA, May 2—A compromise motor truck license fee bill that will effect a saving to Pennsylvania truck owners in the next 2 years of at least \$750,000 per year, has been secured from the Legislature through the movement started by the Motor Truck Assn. of Philadelphia and supported by seven large business organizations of the State.

The compromise bill now only awaits the signature of the Governor to become law, and there is no doubt that he will sign it. The compromise was accomplished by an energetic protest accompanied by a State-wide advertising campaign conducted by various motor trucking interests setting forth that the fees proposed in the Woodruff bill, with increases in license fees ranging from 80 per cent to 210 per cent above existing figures, would prohibit the operation of thousands of trucks and greatly cripple transportation. Under the compromise measure that has passed both Senate and House, the average increase will be about 100 per cent.

The motor truck men also obtained a reclassification of chassis weights, advantageous to trucks of medium size, which is one of the largest classes; and it gives them a lower license fee than they would have been obliged to pay under the old classification per the increased license fee rates.

Under the measure the State will receive almost \$1,000,000 increase in truck license fees, which will be devoted to the use of the State Highway Department for road maintenance.

The rates as finally agreed upon are as follows:

	Weight, Lbs.	Present Rate	Solid Tires	Pneu. Tires
Class AA	2,000 to 3,000...	\$20	\$30	\$24
Class A	3,000 to 4,000...	25	40	32
Class B	4,000 to 5,000...	30	50	40
Class C	5,000 to 6,000...	30	70	56
Class D	6,000 to 7,500...	50	100	80
Class E	7,500 to 8,500...	75	125	100
Class F	More than 8,500...	150	200	160

It was also agreed that electric commercial vehicles equipped with solid tires should be allowed the same rate as pneumatic-tired, gas-propelled trucks. The changes in classification were in Class D, which was made from 6000 to 7500; Class E, from 7500 to 8500, and Class F from 8500 upward, there being added 500 lb. to the maximum in each class.

## Rhode Island Adopts New Tax Method

### Weight and Horsepower Basis for New Fees—Additional Revenue to Be Obtained

PROVIDENCE, R. I., April 29.—In an effort to establish greater equity in fees levied on motor vehicles the Rhode Island General Assembly has passed a bill providing for registration rates based on horsepower and weight which will take effect on July 1. This is the only legislation that was passed during the assembly session. An entire recodification of the state's motor vehicle law introduced late in the session was killed and a dozen other measures, including among them a bill to establish complete reciprocity to non-residents and two anti-theft measures, also failed to pass.

The new measure relating to fees conforms with the uniform fee schedule recommended by several national automobile bodies. It provides that passenger cars and trucks shall be assessed 25 cents per horsepower and 25 cents per hundred pounds of gross weight, if equipped with pneumatic tires. If vehicles are equipped with solid rubber tires the weight rate is 35 cents per hundred, and 50 cents per hundred pounds is assessed upon motor vehicles with metal tires.

Trailers are assessed 15 cents, 25 cents and 35 cents per hundred pounds, depending upon whether they are equipped with pneumatic, solid rubber or metal tires.

Dealers will be charged \$10 per car, with a minimum of \$30 to be required. The present rate is \$5 a car with minimum charge of \$25.

The N. A. C. C. formula—square of bore multiplied by number of cylinders, divided by 2.5—will be used to compute horsepower. This formula has been used by the Rhode Island automobile department for the past 12 years.

The weight to be computed upon passenger cars will be the actual weight of car plus 150 pounds for each passenger seat; for commercial cars the actual weight of the vehicle plus manufacturer's rated load carrying capacity.

Rhode Island's old fee schedule which has been used for the past five years, provides for levying the fee according to horsepower, the passenger cars being divided into four classes.

### 41 Gill Piston Ring Branches

CHICAGO, May 2—With the establishment of branches at Spokane, Washington and 908 Travis Avenue, Houston, Tex., the Gill Mfg. Co. now has forty-one branches prepared to give practically 24-hr. piston ring service.

The extent of this service is further indicated by the announcement that all standard sizes of Gill one-piece piston rings are made in the following oversizes: 0.0025, 0.005, 0.010, 0.015, 0.020, 0.025, 0.031, 0.035, 0.040, 0.045, 0.050.



## Store Door Delivery for Baltimore

**Abolished in That City in 1913  
—Epochal Meeting by  
Highway Council**

WASHINGTON, D. C., May 5—A meeting which was epochal in character insofar as its potentialities are concerned, and which resulted in an agreement to restore the store door delivery system in Baltimore, Maryland, has just been held under the auspices of the Federal Highway Council. Steps leading up to this meeting and the subsequent agreement were taken by the Federal Highway Council's Transportation Committee on Relation of Highways to Railroads and Waterways, of which W. J. L. Banham, general traffic manager of the Otis Elevator Co., and a member of the executive committee of the National Industrial Traffic League, is chairman, and the Sub-Committee on Store Door Delivery, of which Dr. Roy S. MacElwee, former director of the Bureau of Foreign and Domestic Commerce, is chairman.

The meeting was held in the conference room of the Merchants' and Manufacturers' Assn. at Baltimore, Mr. Banham presiding, and was attended by representatives of the Pennsylvania, Baltimore and Ohio, and the Western Maryland Railroads, the shippers of Baltimore, and other members of the Federal Highway Council's Committee. The details of the meeting were arranged by A. E. Beck, traffic manager of the Merchants' and Manufacturers' Assn. of Baltimore, and one of the active members of the Council's Committee.

The result of the meeting was the unanimous agreement for the appointment of a local committee, including representation of the railroads and shippers, and to designate to that committee the working out of details concerning operation. Mr. Banham named Mr. Beck as chairman, representing the Federal Highway Council and the Merchants and Manufacturers' Assn. of Baltimore. When the railroad representatives at the conference asserted that they would co-operate 100 per cent in re-establishing store door delivery, the success of the movement became assured.

The history of store door delivery is an interesting one. It was abolished by the Interstate Commerce Commission in 1913, after 47 years' existence in Baltimore and Washington, on the grounds that it was discriminatory because of its use only in the two cities mentioned and did not prevail in other places.

It is authoritatively stated that a saving to Baltimore shippers alone of between two and three millions of dollars annually will be brought about. In addition, a greater saving to the carriers will be made possible with the adoption of the system in Baltimore and its ex-

tension throughout the country, in that the present serious problems of extended terminal facilities to meet the expected increased demands of traffic will be eliminated. Another big saving, it is suggested, will be made possible, in that the rolling stock will not have to be increased to the extent that it otherwise would, due to the rapid unloading of freight cars once they reach the terminal and the possibility of putting them immediately into use again. Particularly will this prove true, it is believed, during the periods of the year when heaviest demands are made upon the rolling stock.

S. M. Williams, chairman of the Federal Highway Council, states: "When the store door delivery plan is again in reality in Baltimore, and this is expected within a short time, similar steps will be taken with respect to other cities, eight of which are already requesting the co-operation of the Council in its establishment."

This great economic program has furnished the basis of much extensive work on the part of the Transportation Committees of the Federal Highway Council during the past two years and the achievement of results such as those that characterize the vastly important meeting held in Baltimore, naturally are a source of gratification to the Council's membership as a whole. The benefits which will most certainly accrue to the entire country will represent untold millions of dollars annually.

## Long Distance Haulers Organize

PHILADELPHIA, April 13—The Philadelphia Association of Long Distance Trucking Companies has been organized, the first meeting being attended by thirteen New York-to-Philadelphia motor transport companies. These companies wish to standardize the freight rates and to present legislation that will make for the safe passage of trucks throughout the 110-mile trip to New York.

## New Atterbury Service Station

PHILADELPHIA, May 11—The Atterbury Motor Truck Co. has opened up a large new service building at 3322 North Broad Street.

## Coming Events

1921

- May 17-19. Buffalo, N. Y., Spring Meeting of Service Managers of National Automobile Chamber of Commerce, Iroquois Hotel.
- June 13-16. Detroit, Mich., Annual Convention of National Team and Motor Truck Owners, Inc., held aboard ship during cruise on Steamship Naronic.
- June 15.... Philadelphia, Pa., Annual Outing of the Motor Truck Ass'n of Philadelphia, Lu Lu Country Club.
- June 23-25. Milwaukee, Convention National Association of Commercial Haulers.
- Sept. 28-30. New York City, Electrical Show, 71st Regiment Armory.
- Sept. 2 weeks. Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.

## New Company to Make Steam Truck

**New Vehicle Makes Good Performance Before Bus Engineers**

ST. LOUIS, May 3—A manufacturing corporation to produce in St. Louis the steam vehicle designed during the past 3 years under the auspices of the Standard Engineering Co. has been formed under the name of the Standard Steam Corp. A steam motor truck is added to the passenger car, which was the first product designed by the company. All the assets of the company are taken over by the newly formed organization.

The chief interest centers in the steam motor truck which the corporation plans to produce, in view of the fact that it will be the first concern to manufacture this type of vehicle. L. L. Scott is designer of both the passenger car and the truck, and has embodied many new principles in the new engine.

The Fifth Avenue Coach Co., which operates 300 motor buses in New York City, sent its general manager, G. A. Green, and two engineers to inspect and test the steam truck with a view of inaugurating the use of the steamers in their bus system. The final result of their investigations in this respect have not as yet been made known here.

"The points brought out by these tests," Scott said, "are high fuel mileage on kerosene or fuel oil, rapid acceleration, and low upkeep cost because of the elimination of clutch and gear box."

"The Fifth Avenue buses make about 1000 stops a day. This starting and stopping is destructive to a heavy bus that uses the gasoline powerplant."

"Pneumatic tires are coming into general use on trucks up to 3 tons. To take full advantage of the pneumatic tire, the truck should be capable of running from 25 to 30 m.p.h. This speed calls for a certain change in the design of gasoline trucks; the rear axle gear ratio must be around 5 to 11 in order to keep the engine speed down, and change in the rear axle gear ratio calls for a different transmission."

"The steam truck uses no transmission, has a 5 to 1 rear axle ratio, and can run 30 m.p.h. or even faster. It is designed to carry 2 tons, but we have loaded 3½ tons on it and had no trouble in negotiating a 15 per cent grade."

"Acceleration tests made by the Fifth Avenue Coach Co. showed that it would accelerate from 150 to 400 per cent faster than their buses using gasoline powerplants. We can reach 15 m.p.h. from a stop in 3 seconds."

## Prices Drop in Middle West

CHICAGO, May 2—A drop of 3 cents in the price of gasoline in Chicago and the Middle Western States was announced last week by the Standard Oil Co. of Indiana.





THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President      E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. C. Building  
239 West 39th Street, New York

CONTENTS

Vol. XXIV, No. 9      June 1, 1921

LEADING ARTICLES

Can Expensive Deliveries Pay? .....	269
A Service System That Makes Profits Will Also	
Cut Costs .....	272

MISCELLANEOUS ARTICLES

Trucks in Road Construction Work .....	274
Loading Trucks from Both Sides .....	275
Clean Up Where You Can! .....	280
Do You Play Bridge? .....	281
Costs \$2.48 Per Mile and Saves \$7,000 .....	282

DEPARTMENTS

Overhauling the Wisconsin Engine .....	276
The Better Way .....	284
Buyer's Department .....	287-293
New Bodies .....	287
New 2½-Ton Facto Truck .....	288
Standard 1½-Tonner Designed for Speedy De-	
liveries .....	289
G. & J. a Newcomer in the Motor Truck Field	289
Truck Accessories .....	290
New Shop Equipment .....	292
Motor Truck Electric System Wiring Diagrams ...	294
The Fleet Owners' Forum .....	295
Editorial: Steering Economically .....	298

NEWS

Store Door Delivery to be Provided .....	293
New Army Bill Orders Truck Sale .....	299
To Lecture on Truck Service .....	300
Californians Want Better Service .....	300

Index to Advertisers.....92-93

The Commercial Vehicle

Charles W. Blackman, General Manager

EDITORIAL DEPARTMENT

David Beccroft, Directing Editor  
Ray W. Sherman, Executive Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

BRANCH OFFICES

Chicago, Mallery Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devon-

SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account	
of Zone Postage Law .....	50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

WYMAN-GORDON  
The CRANKSHAFT MAKERS  
WORCESTER, MASS.      CHICAGO, ILL.      CLEVELAND, OHIO

ESSENTIALS

MOTOR PERFORMANCE heads the list of essentials a manufacturer must consider and the CRANK-SHAFT makes or mars the operation of any motor.

THE SELECTION OF A WYMAN-GORDON CRANK-SHAFT not only guarantees the best results but is *prima facie* evidence that the manufacturer is satisfied with nothing but the best.

OUR ENGINEERING DEPARTMENT is at your service in connection with any problems of crankshaft design.

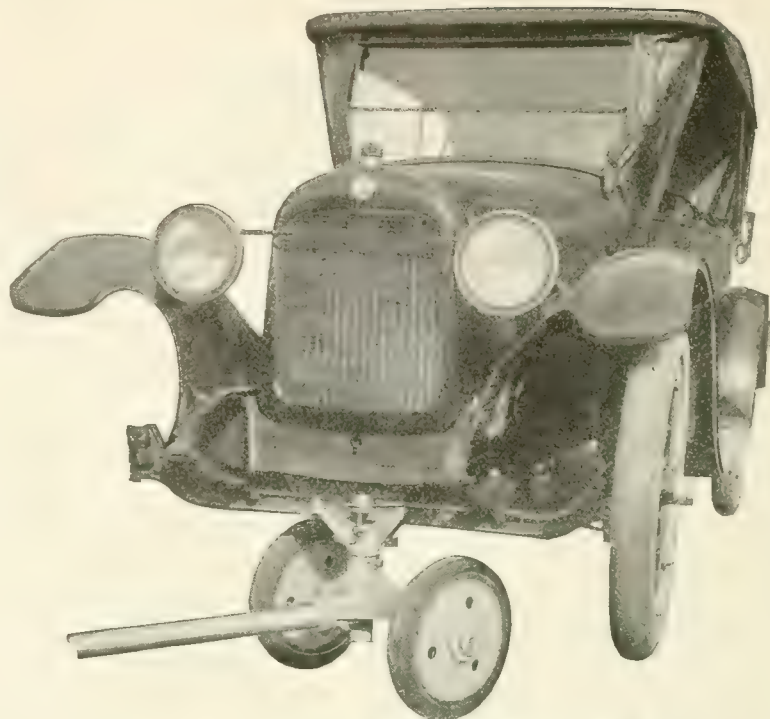
OUR TWO LARGE PLANTS protect your deliveries as scheduled.

OUR THIRTY-EIGHT YEARS EXPERIENCE in the forging industry guarantees the quality of our product.

FORGE SHOPS AT  
WORCESTER, MASS.      HARVEY, ILL.



*Continental Shop Equipment is used and recommended by the leading manufacturers, garages and service stations from coast to coast.*



*Showing Continental Wrecking Truck in use with a passenger car. It is designed and adaptable for use with every type of motor vehicle.*

## You Can Depend On the Continental

When your men go out after a wreck with a Continental Wrecking Truck, you know that they will bring it into your shop quickly and easily.

You know that they won't have to stop every few miles to fasten the truck on the wrecking truck more securely. You save in prevention of further damage to the wreck and in the less time and labor required.

The Continental is the better wrecking truck—superior in construction and in the service it gives. Three-inch solid rubber tires take the jar and strain from the wreck; Hyatt roller bearings in the wheels where they belong and not in the axle. The axle does not revolve. The telescopic tongue permits the truck to be used under front or rear axle. The patented saddle grips the axle of the truck and makes it impossible for the wreck to get away from the wrecking truck. The long bearing that supports the saddle post overcomes the tendency to keel and prevents smashing the wrecking truck, on very rough roads.

Don't take a chance on your truck becoming a worse wreck than it is—see that it's brought in on a Continental.

Let Continental equipment answer every service problem for you. Our new catalog will show you how. Write for your copy today.

**Continental Auto Parts Co.**

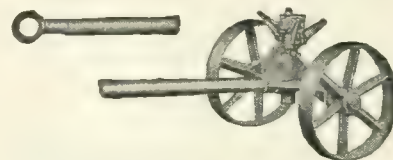
2206 E. 17th St.

Columbus, Ind.

*Manufacturers of*



*The Model R, complete with rubber tires, Hyatt roller bearings, extension tongue, patented saddle and special bearing in saddle post. A truck that you can always depend upon.*



*The Model S is the same in every feature as the Model R, with the exception of the rubber tires. It was designed for use over country roads where the additional investment in a Model R is not advisable.*

# CONTINENTAL

*"The Efficiency Standard"*

# SHOP EQUIPMENT



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Vol. XXIV June 1, 1921 No. 9

## Can Expensive Deliveries Pay?

### Where Delivery Service Comes First and Cutting Delivery Costs Second!

**T**HERE are some classes of motor truck transportation, where perfection of delivery service is more important than cutting costs.

This does not mean that keeping down costs is not important. It is always important. But sometimes it is of secondary importance.

From the point of view of the fleet owner, delivering a reasonably satisfactory service is an end to be desired.

But usually delivering that service at the lowest possible cost is the factor of prime importance. But in some cases, such as high grade department store delivery, the excellence of the service rendered is the main thing and delivering service at the lowest possible cost is of secondary importance.

Thus excellence of service and cheapness of service are on opposite sides of the scales. And sometimes one tips the balance and sometimes the other.

It might be supposed that the same system would be employed in both cases. To some extent this is true. But to an even greater extent, the importance of maintaining a high class service will alter the system for such a fleet, modifying cost cutting methods here, eliminating them altogether there, and even calling for the installation of an entirely different system of maintenance as well as a better equipment of both trucks and machinery in the first place.

It is such a delivery system which is discussed in the following two pages. Here costs are to be reduced as much as possible—naturally. But cost reduction is not the primary consideration.

The one goal toward which the system is aiming is the best possible delivery service which can be attained by the best quality of motor trucks. And after that goal has

been reached, then—and not till then—costs can be reduced as much as possible, without reducing the quality of the delivery service.

The system in question is that of the Eleto Co., which handles all deliveries for Lord & Taylor and for James McCreery & Co., two of the largest department stores in New York City.

Robert H. Forbes, president of the Eleto Company, states that the primary aim of the company is to give the best possible service to the customers of the two stores. And with that in mind, the administration and maintenance of the company's big fleet of 166 trucks has been organized, with the cost a secondary consideration.

In the following two pages are given the details of the organization as described by Joseph E. McLaughlin, superintendent of the main repair shop of the company, showing how the system has been adapted to the primary aim of the best possible delivery system at all times.

If your trucks are handling the same type of high class deliveries for department store work in large towns, there may be suggestions for you in the experience of the Eleto Co. But in any case, the company has cut costs where it has been able to

do so, without decreasing the efficiency of the delivery service. Therefore there should be useful hints in the article for any fleet owner who desires to cut his costs wherever possible.

It is interesting to note that, in the opinion of the garage superintendent of the Eleto Co., one of the most important items in keeping down costs on a large fleet is a careful check up on tire mileage.



Joseph E. McLaughlin (on the right) having a talk with his foreman on the subject of piston ring clearance



# Keeping Deliveries Up and Then —Keeping Costs Down

“THE other day I worked out roughly the mileage covered by our trucks. It came to well over 3,000,000 miles. And during that time we haven't lost 4 hours running time on deliveries. So I guess the system speaks for itself, so far as good delivery service is concerned.”

These are the words of Joseph E. McLaughlin, superintendent of the main garage of the Eleto Co., which handles all deliveries for Lord & Taylor and James McCreery & Co. Then Mr. McLaughlin went on to describe how a system was devised, first, to insure perfection of delivery and, second, to keep down the cost of such delivery.

## System Requires Spare Trucks

In the first place, the Eleto Co. system is based on having spare trucks always available at strategic points. Thus the company has four out-of-town garages and in each of these there is at least one spare truck available all the time. By this arrangement, the maximum of deliveries can always be handled efficiently, even when a regular truck breaks down at a time when deliveries are heaviest.

Trucks would be available almost as quickly, if the company had installed the unit repair system at each of these garages, so that a worn or broken part could be replaced at once. But the cost of maintaining four stocks of spares and four repair departments would have been

prohibitive. Indeed, at one time, the company had a mechanic at each of these four stations.

Now, however, the system is entirely different. All mechanics have been removed from the out-of-town garages and replaced by an inspector and no stock of spare parts is carried at these garages. Nor is the unit repair system used at all.

## How Costs Are Kept Down

Having installed the costly but necessary system of spare vehicles, the company devoted its attention to reducing the cost of it as much as possible. The first need was that of an inspection system which would catch weaknesses before they grew into breakdowns. This was attained by means of daily drivers' reports and by the inspector already mentioned.

The inspector is an expert on the trucks of which the fleet is composed—mostly Whites—and is responsible for their condition. He has a car of his own and he travels from one garage to the other inspecting the trucks.

The inspector gets around to each truck about once in three weeks. He inspects each truck thoroughly and reports anything wrong and when it is likely to break. Then the superintendent of the main garage arranges matters so that that truck runs in to the main garage before that time. By this system the

company not only corrects the fault but gets full wear out of the parts.

## In Case of Breakdown

But if there should be a breakdown before the truck gets to the main garage for repair, the driver telephones in to the main garage and the trouble car goes out and makes a temporary repair. The damaged truck is then run in to the main garage under its own power for a more complete repair.

When a truck is under repair at the main garage, the disassembled parts are taken out and placed on a bench, labeled according to the truck to which they belong. The foreman then checks up as to whether an oversize bushing or an oversize pin will serve for the repair. This also saves parts.

The unit repair system is not used because of the expense of installing it at all the garages, but also for another reason. The company does not believe that with this system it is possible to check up on the service given by the truck as a whole and therefore, presumably, upon the way the driver is treating that truck.

Further, to check up on both drivers and trucks, the company does not change drivers from one truck to another. Then if anything goes wrong with a truck repeatedly, the driver is changed to see whether it is his fault.

This repair system and this driver sys-



*The body building department of the Eleto repair shop. All the bodies for all the company's trucks are built here in this department and the men are fully equipped with modern wood working tools. Here, too, a considerable saving is effected*





# A Service System That Makes Profits —Will Also Cut Costs!

## A Story of How the Fleet Owner Can Learn from the Manufacturer

**T**HE service station of the manufacturer and the service station of the fleet owner are founded on the same principle and to the same end—to give service.

The manufacturer's service station makes profits and the fleet owner's service station cuts costs. Otherwise the two differ only in degree.

Therefore, there is much which the fleet owner can learn from the manufacturer's more complete and more carefully organized service station.

In this regard, a study of the big Selden service station in New York known as the Manhattan Motors Corp. may well prove an inspiration to a fleet owner.

The system is an excellent one, and the observer who delves below the surface and studies the principles upon which the service is built may learn much which he can apply, in a lesser degree, to his own service problems.

single fleet except perhaps one of the larger size.

Nevertheless there is much in the system which the fleet owner can adapt to his own needs most profitably.

### Disassembly and Repair System

In the first place the matter of the detail of repair is thoroughly organized and systematized at the Manhattan Motors Corp. Aside from the paper work involved in recording the needs of the truck and the name of the owner, which do not apply to a fleet owner, there is a definite place appointed for the truck the moment it enters the shop according to the class of repair required.

A glance at one of the accompanying illustrations will show how this is worked out. The big main floor of the building is divided up into sections devoted to disassembly, engine repair, axle repair, transmission repair, etc. If the truck requires more than one repair or requires complete overhaul it goes to the disassembly station. If it requires re-

sembly station. Here they are out of the way of new trucks coming in and requiring repair or replacement.

But in order to replace damaged parts, new parts must not only be on hand but, to attain high efficiency, must be immediately available. The stocking of so complete a supply of spare parts would be out of the question for a fleet owner, as a glance at the illustration of the spare parts room will indicate. But the manner in which these parts are stocked might well be emulated by the fleet owner in stocking his own lesser supply, depending on the size of the fleet.

The spare parts are stocked on wide deep shelves or, in the case of large parts such as wheels, springs and front axles, on the floor. But there is a definite place for each part which never varies. Moreover, one of the floor men, in addition to his other work, is solely responsible for insuring that no part however small shall be lower in quantity than a certain fixed number at any time. This important part of the organization might well be copied by fleet owners who appreciate the value of the unit repair system and have installed it in their own service stations.

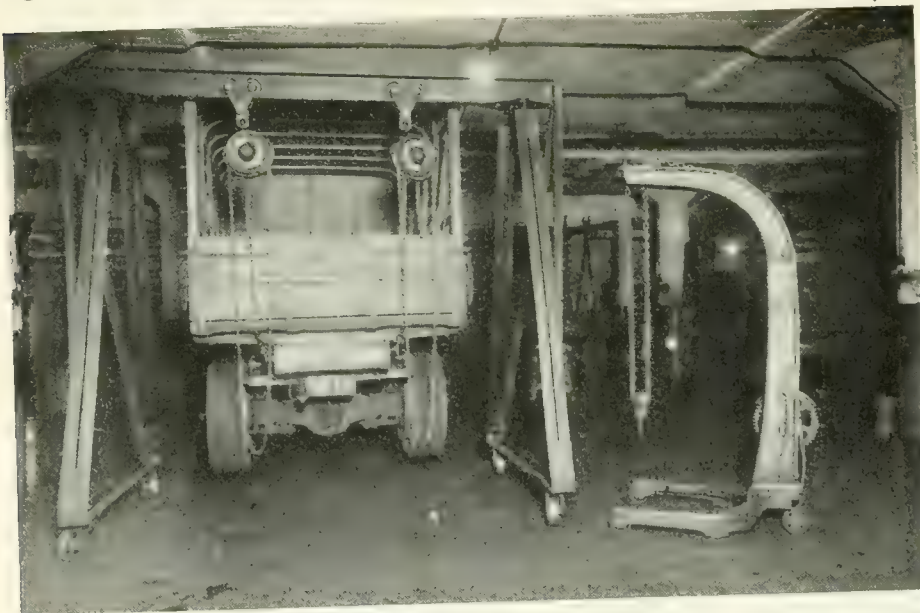
### The Question of Tools

There are two systems in the organization of the Manhattan Motors Corp. which insure first the right kind of tool; second an adequate supply of these and third the possibility of locating them promptly when needed.

In the first place, all tools and small parts such as nuts, bolts, and parts of units are kept in a separate stock room in smaller compartments presided over by a stock clerk. When a mechanic wishes to draw a tool from stock he must turn in in its place one of the small brass tags, bearing his number, with which the company supplies him. This makes it possible to locate a tool immediately and also keeps a check on the stock to prevent loss by carelessness or theft.

In the second place, the stock clerk is responsible for maintaining an adequate supply of all small parts and tools as these are used up or become unserviceable.

But, in the third place, the company has an installation of machine tools of an excellent quality but of a number and cost which would not necessarily be prohibitive to the owner of a larger fleet. The equipment consists of a lathe, a grinder, two drill presses and an arbor press. This equipment, however, is not



*Two big cranes, each of them capable of lifting the rear of a heavy truck, which save time and labor in the Manhattan Motors Corp. service station. The larger crane is steadier, for work which will require some time, while the smaller crane is simpler to maneuver into position, when only required for a short time*

Of course there are certain features of the service which the fleet owner can never hope to emulate because the expense of installation of the machinery and parts essential to such a service would be prohibitive for the maintenance of a

pairs on only one part it goes to the station where that part is repaired.

Subsequently when repairs are completed or replacement parts have been collected, the truck and the replacement parts or repaired parts go to the as-



intended for such repairs as regrinding cylinders and other major repairs of this nature, although it can be used for these and could be so used by the fleet owner with a similar equipment. But the corporation uses this equipment mainly for making tools especially adapted to the needs of the Selden truck and for replacing these tools as the stock of them becomes low. Thus the company not only insures an adequate supply of tools but insures that the tools so supplied shall be of a nature best adapted to the work which they are to do.

Major repairs, such as regrinding cylinders, are sent out to shops specializing in this work.

Naturally, too, the corporation has supplied itself with many different types of labor saving devices.

Time Saving Equipment

One piece of equipment of which the corporation is particularly proud can be seen in the illustration of the machine shop. It is a set of expansion reamers, an economy for a large fleet owner, insuring accurate repairs and saving an immense amount of time and labor.

Bearings are never scraped at the service station. The expansion reamers, of sizes to fit any bearing which the corporation is called upon to install, are used in all cases where new bearings are to be installed. And they not only insure a perfect surface and a perfect fit, but at the same time insure perfect alignment in all bearings, for example, in the case of crankshaft bearings or camshaft bearings.

This set of bearings can be seen to the right of the illustration of the machine shop.

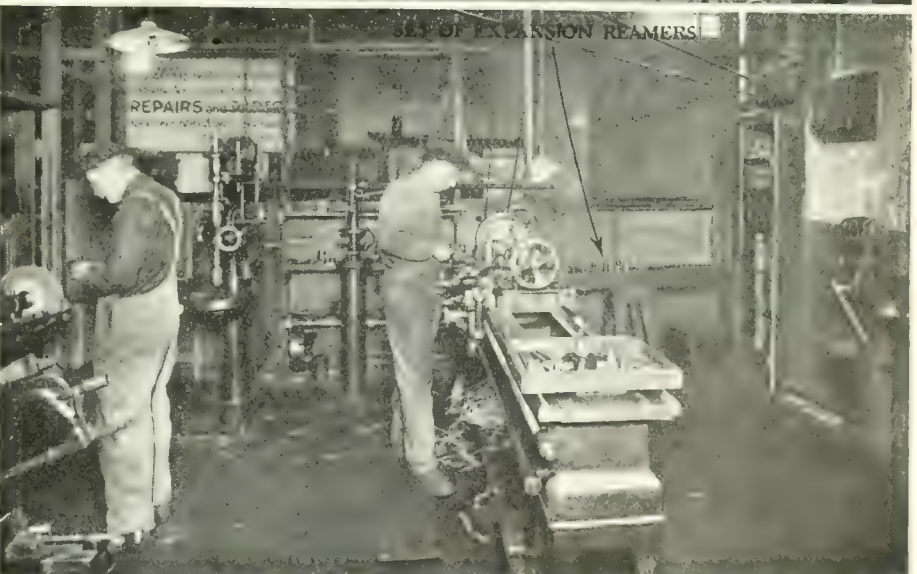
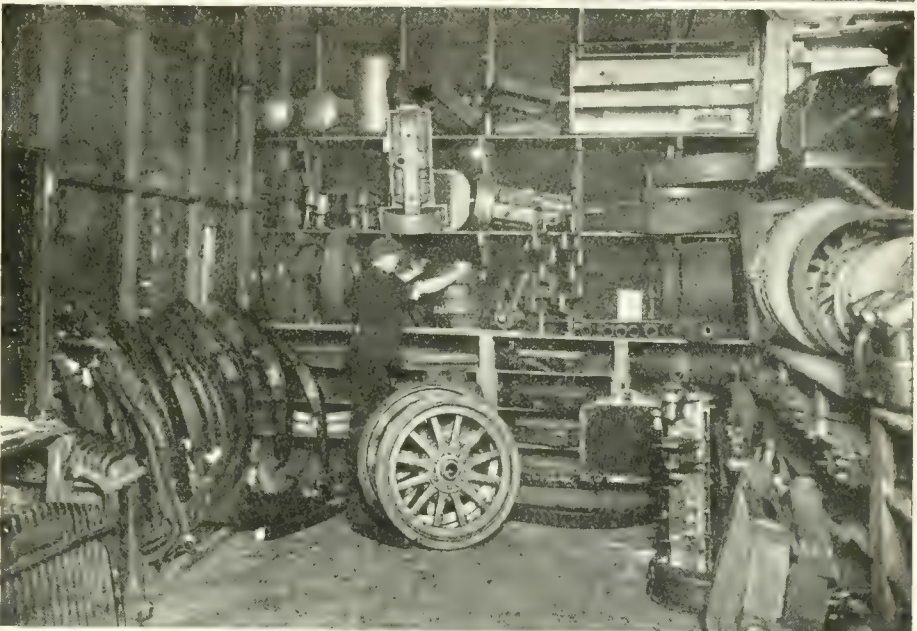
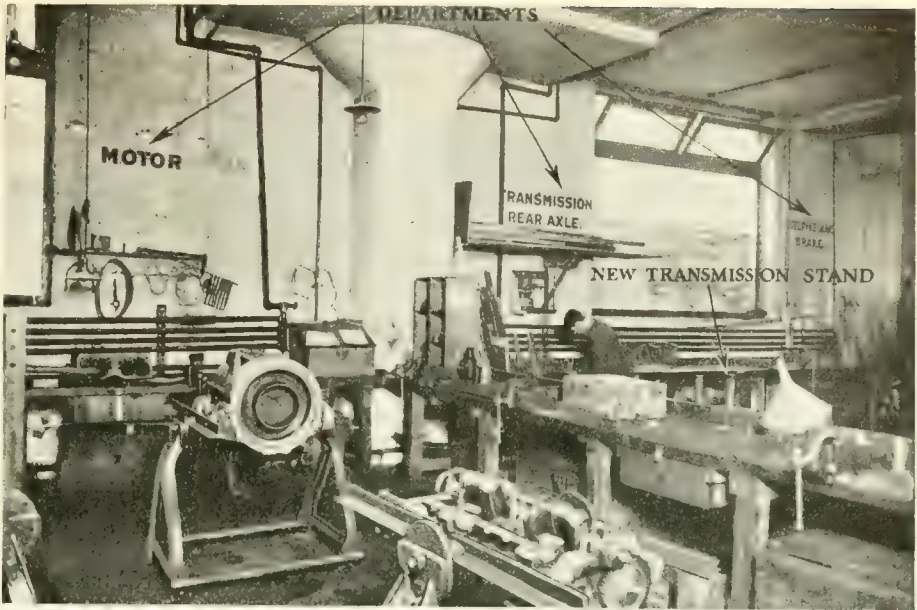
Another type of equipment of which the company is justly proud is the equipment of portable cranes. Two of these can be seen in one of the illustrations. The smaller is a Canton 3½-ton crane. The large crane is manufactured by the Bacon Co., of Brooklyn, and has a nominal capacity of 5 tons. However, it is equipped with two Yale & Towne Mfg. Co. block and falls, each with a capacity of 1½ tons. A lifting capacity of 3 tons is ample for most jobs which the crane is called upon to do.

Example to Fleet Owners

It must not be understood that fleet owners, particularly small fleet owners, are recommended to emulate the system, stock and equipment of such a service station as that of the Manhattan Motors Corporation. In most cases such an organization would be too costly to be justified by the size of the fleet.

But the point is that such a system and organization and installation DOES insure competent, accurate, speedy service. It has been carefully worked out and brought as nearly as possible to perfection.

Therefore, fleet owners may well adapt to their own needs, such of the system as is justified by the size of their fleet, so as to insure for themselves as nearly as possible the same perfection in service repairs.

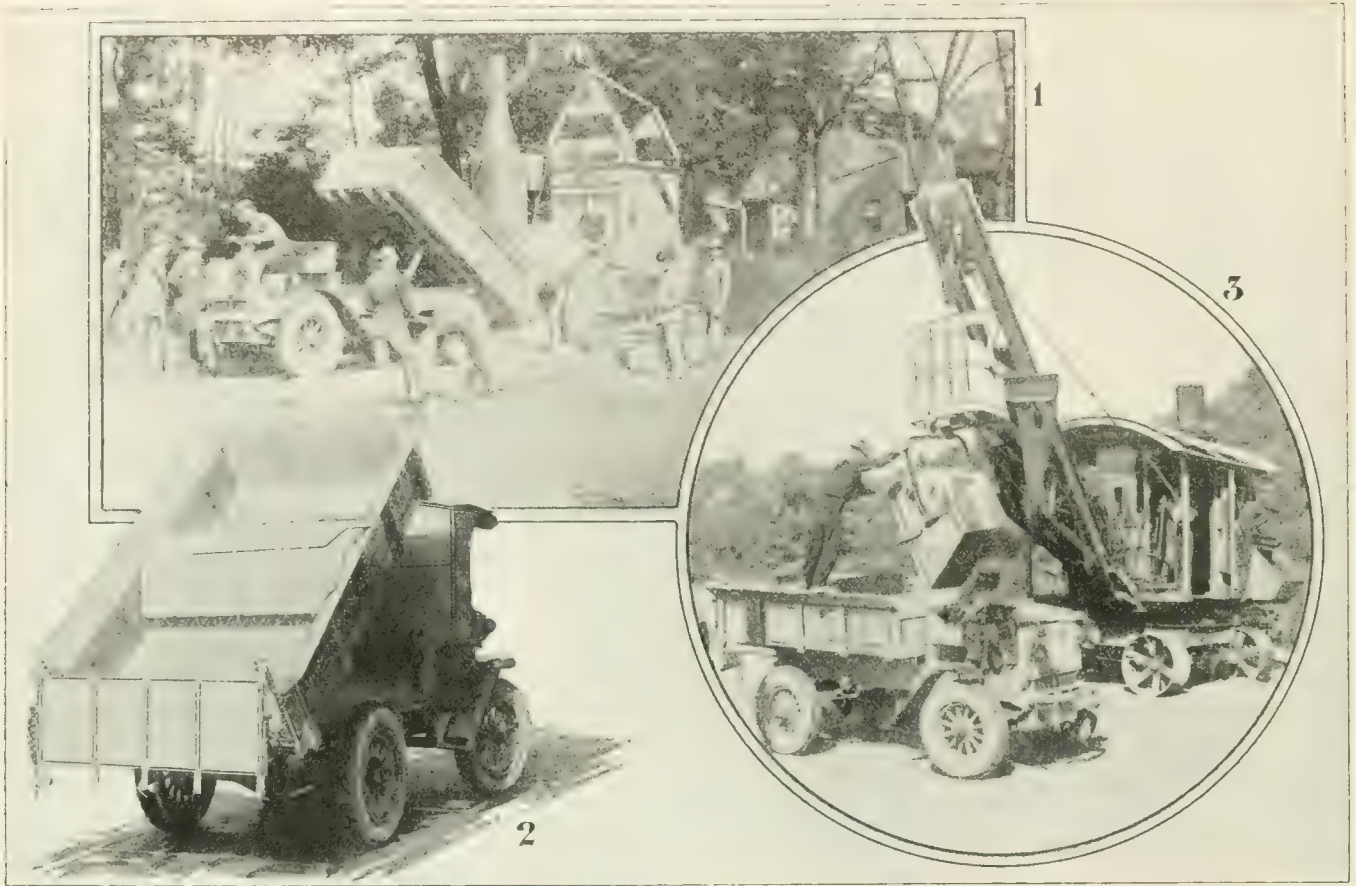


Top—Where the repair work is done. Note the departments, the engine stands and the new transmission stand in process of construction. Middle—Part of the spare parts department, showing the type of equipment always available. Bottom—Where the new tools are made. This room is shut off from the rest of the garage by a high wire partition to prevent accident and theft



# Trucks in Road Construction Work

*Three-way Combination Bodies on the Lincoln Highway*



1—Truck owned and operated by the Weldon Contracting Co. in its roadbuilding activities, dumping a load conveniently close to the mixer. 2—View of the same Autocar showing the construction of the three-way body. 3—Loading one of the Autocars with a steam shovel from buckets already filled by the shovel when the truck was away on a run

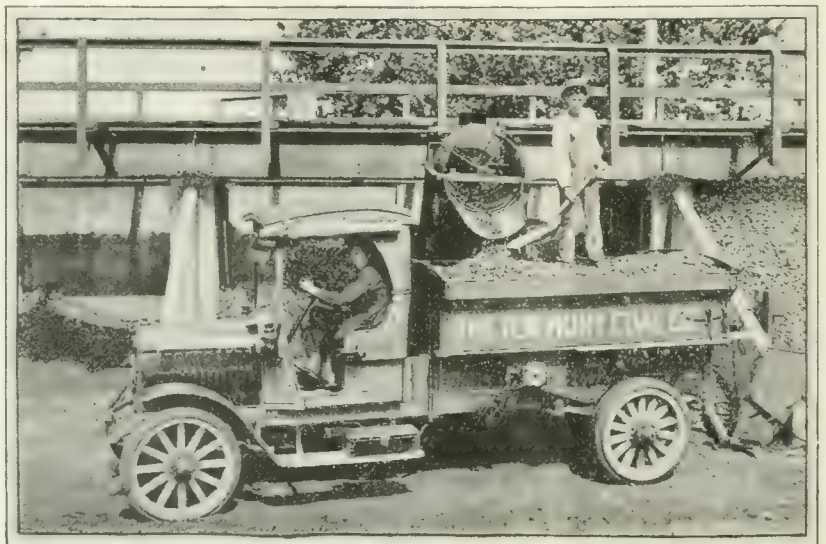
## Cleans the Coal While Loading

**Loader and Dump Body  
Eliminate Hand Work**

**W**ITH this loader the truck averages a load of coal once every half-hour! Moreover, the loader cleans the coal as it loads it.

This speed record is partly due also to the fact that the truck is equipped with a convenient type of dump body, which enables the driver to dump straight into the cellar windows of the schools or public buildings to which most of the coal is delivered.

R. W. Hunt & Son, who operate truck and loader, state that in installing the latter they were in search of a loader which would clean the coal at the same time. "We were not satisfied with the straight or shaking screen type, so turned to the Converse loader, which is equipped with a rotary screen that cleans the coal per-



fectly, and loads at the rate of 1 ton in 3½ min. The F. S. Converse Co. of Johnson City, N. Y., are the manufacturers of these machines.

"The driver of the truck backs under

a high steel hopper and climbs the trestle from the truck. Then a few pushes with a strong steel rod and the truck is loaded with an average of 2½ tons of coal in less than 10 minutes."



# Loading Trucks from Both Sides

## Grooves in Truck Driveway Make Maneuvering Easy

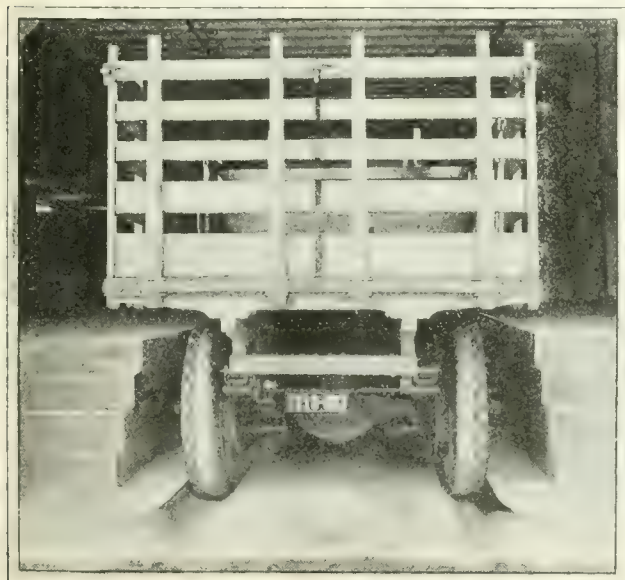
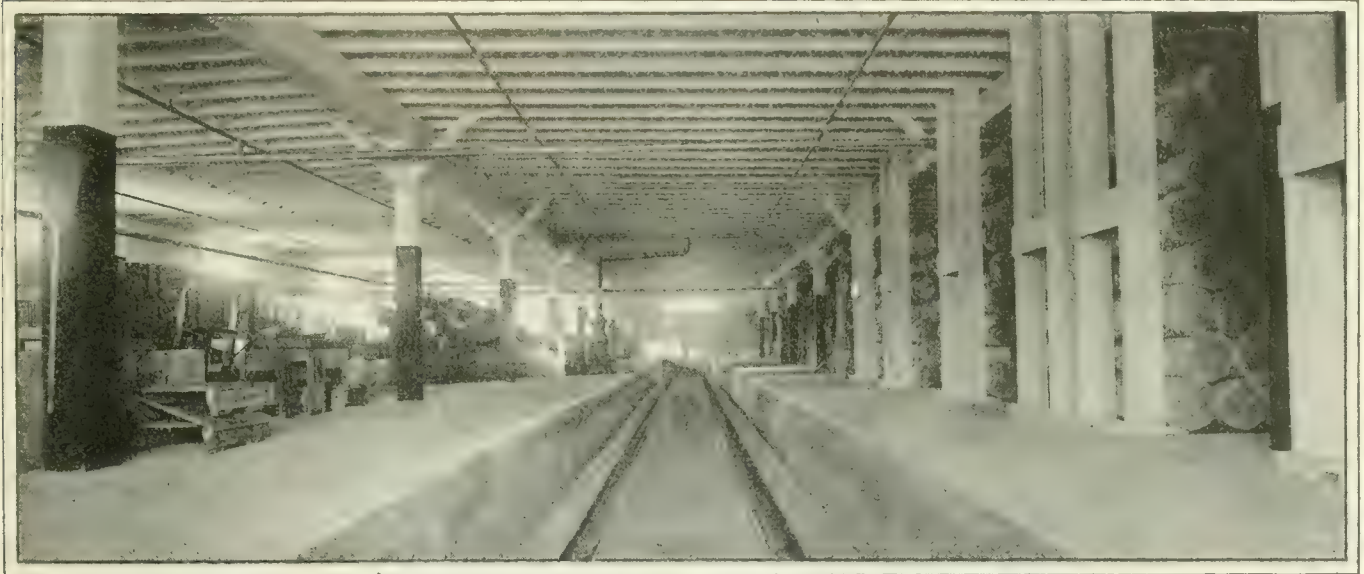
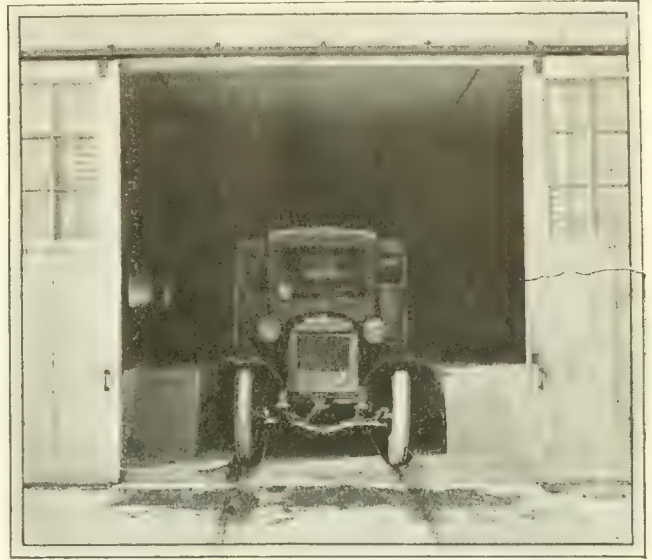
**I**N the new warehouse of the Clipper Belt Lacer Co., Grand Rapids, Mich., it was not convenient:

First, to load trucks at the tailgate or at only one side, because of the speed in loading necessary to keep the goods moving up to schedule.

Second, to build a driveway at each end of the building, so that trucks could drive straight through, with a loading platform on each side.

The double loading platform was so great a convenience as to be almost essential. So the company devised a system which would permit the trucks to be loaded from both sides at once, without the necessity of an entrance and an exit.

The illustrations show how the scheme worked out. With the big warehouse platforms a convenient height above street



level, it was easy to build a driveway running between the platforms. Also it was easy for the trucks to drive in between the two platforms.

But unless there was another exit to the driveway, so that the trucks having driven in could drive on and out again, it would have been exceedingly difficult to maneuver them, because it necessitated backing for a long distance through a very narrow channel.

Finally the solution was reached. The narrow driveway was built. But in the floor of it, grooves were cut for the wheels of the standardized fleet. So that in order to back out again, the driver had merely to let go of his wheel and put his truck into reverse.

The grooves are V-shape, with both sides thirty degrees from the horizontal. On the two outside edges, there is a slight rise of thirty degrees to the vertical. This was done so that if the wheels did climb the side of the V they would go no further than this thirty degrees from vertical.

In building a similar driveway, however, care must be taken to see that the distance from center to center of the V-shaped grooves is exactly the same as the tread of the truck.

The platforms between which the trucks run are 8 ft. apart.

# OVERHAULING THE WISCONSIN ENGINE

## *How to Disassemble, Adjust and Repair the Seven Types of Truck Power Plants*

**T**HE Wisconsin Motor is made at Milwaukee by the Wisconsin Motor Mfg. Co. The seven different types of truck engines manufactured by this company may be divided into three groups, the type CAU  $3\frac{3}{4} \times 5$  and type EAU  $4 \times 5$  come in the first group. The type TAU  $4 \times 6$  and the type UAU  $4\frac{1}{4} \times 6$  and VAU  $4\frac{1}{2} \times 6$  come under the second group. Types RAU  $4\frac{3}{4} \times 6$  and RBU  $5 \times 6$  comprise the third group. For each type engine in one of the above groups, the interchange of parts is possible between the motors contained in that group with the exception of the cylinder block, piston and rings.

### **Disassembling the Engine**

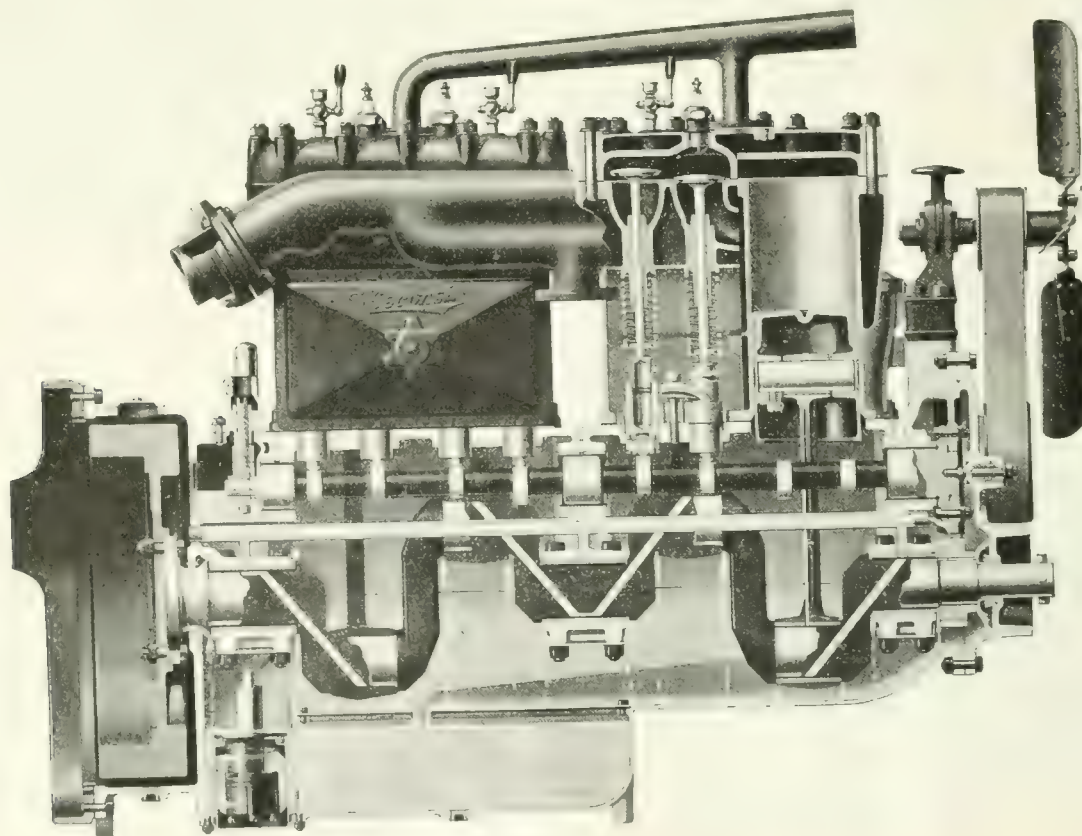
**I**N the process of overhauling a truck engine, one always wants to keep in mind that the most difficult part of the

job is the assembling of the various parts. Therefore, before any parts of the engine are removed the space and work bench at which the overhauling is to be done should be cleaned up and a number of boxes provided to receive the various parts of the engine as they are taken off. For instance, the nuts, washers and bolts belonging to the crankcase cover should be put in a separate receptacle from those that hold the front cover in place. Also a very excellent idea is to have a pad and pencil handy with which to make notes to help refresh the memory of the mechanic as to just where the various nuts, screws and washers or parts come from.

For a thorough overhauling and inspection of all parts of the engine, the same should be removed from the truck and placed in an inverted position on the floor or bench if a rack is not available. To start with, all the water and oil should be drained off, the radiator should

be removed, and all throttle connections and wires should be disconnected. The spark plugs should also be removed and wooden corks placed in the openings in the cylinder head to prevent chips and dirt from getting in. Next, all bolts and nuts on the clutch and on supports of the engine should be removed. The engine is then ready to be taken out of the chassis. This should be done with the aid of a block and chain.

After the engine has been placed on the floor or rack in an inverted position, the lower cover may readily be removed. Care, however, should be taken not to destroy the paper gasket in removing the cover. The gear cover should be removed next. After this has been done, one is ready to begin taking off the connecting rod bearing caps and to remove the pistons by carefully pulling them up out of the cylinder past the crankshaft. In the types CAU, EAU and BRU motors, this, however, cannot



*Side elevation of engine, showing lubricating system*



be done on account of the size of the bore of the motor and the pistons must then be wired or fastened in some way to the side of the crankcase to prevent them from slipping down past the top of the cylinder wall, or difficulty will be found in removing same owing to the piston ring locking with the head of the cylinder wall.

In removing the bearing caps, one must be careful not to lose or interchange any of the shims as this would incur additional work in refitting the cap with proper bearing tension. The bearing caps are all marked with numbers on the side to prevent any interchange of these caps. The main crankshaft bearing caps come next, and with these the same precaution must be taken not to lose or change any of the shims.

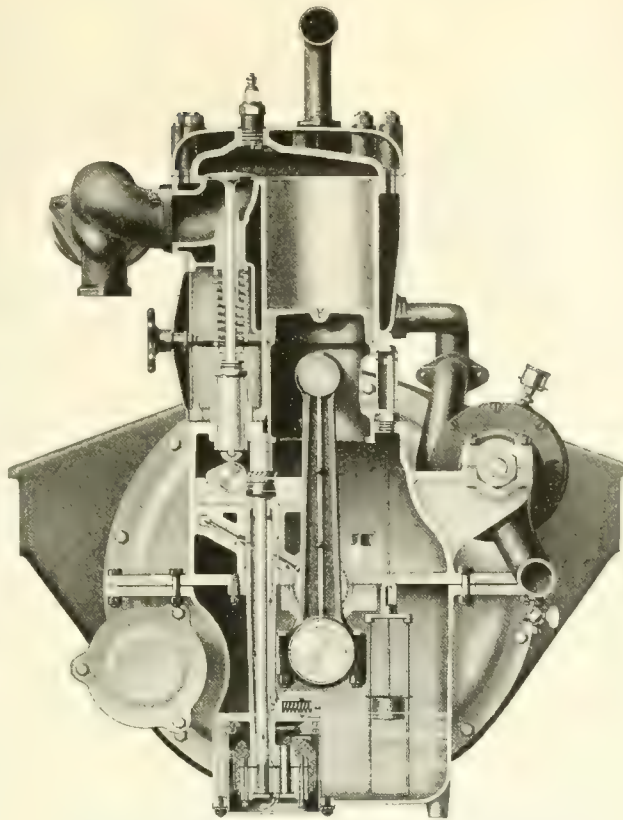
To prevent injury to the crankshaft in removing same from the bearings, the four end main bearing studs should be covered with short ends of an old garden hose, as this will guard against a probable nick or scratch on the bearing surface of the crankshaft. The flywheel, of course, should be removed before the crankshaft is taken out. The crankshaft must be very carefully handled at all times, and should be set in a safe and out-of-the-way place.

## Fitting Bearings

Should any of the main bearings need replacing, the brass anchor screws should be removed and the old bearing shell taken out. In order that the new bearing shell is assured of a firm backing or seat, it should be carefully cleaned and freed from chips, burrs and dirt. Prussian blue should be applied to the back of the bushing and same should then be pressed into position and moved back and forth in its groove or seat so that the blue paint will clearly show the high spots on the aluminum case.

If the bronze back bushing does not have a full bearing surface on the case, the high spots should be scraped and the operation of moving the bearing shell in groove repeated until bearing surface is made uniform. If a bearing shell does not have a good backing, all the scraping and fitting that is done on the babbitting surface later on will give way when the first pressure is applied by the explosion in the cylinder. It is just as important to have the shell fit snugly in the case as to have the shaft fit properly into the bearing.

At this point another vital thing to remember is to make sure that the oil hole in the bearing shell lines up properly with the oil hole in the case and also that it is free from chips or dirt that may clog same. After the bearing shell has been given the proper backing, the brass anchor screws may be replaced and locked in position by means of a center



Front elevation of engine, showing lubricating system, with sections through oil pump column and oil gage

punch. All oil grooves in the bearings should be at least 3/64 in. deep.

The fitting and the scraping of the bearing to their crankshaft comes next. The babbitting metal should be carefully scraped to fit the shaft for the full circle. The main crankshaft bearings should be smeared with prussian blue, and the shaft then let into the bearing and revolved back and forth so as to get the blue on the babbit metal and to mark clearly the high spots on the bearing surface. These high spots must be

scraped down until the bearing surface of the main bearings all show a uniform contact with the shaft.

In fitting a new bearing shell to a main bearing cap, the same operation is followed as that of fitting the bearing cap on the crankcase.

After the bearings have all been scraped to fit the circle of the shaft, the bearing caps should then be put on and tension of same should be adjusted by means of the shims. The nuts must always be drawn up snugly; the diagonally opposing nuts should always be tightened at the same time, that is, no two bolts on the same side of bearing should be drawn up tightly before starting on the nuts on opposite side.

It is always good practice to fit up the main bearing beginning at the flywheel end of the motor. The proper tension on the main bearings should all be tested separately. The proper tension on the main bearings can readily be felt by turning the shaft by means of a crank. There should be a noticeable drag in turning it over.

The connecting rod bearings are all fitted to their respective crankshaft bearings by securely fastening the crankshaft to the

end of the table and working the connecting rod about its respective bearing surface.

The amount of end play is very important in fitting up all the bearings. The connecting rod bearings should be fitted up with .003 to .004 of an inch end play, while the rear main bearings, which take all the thrust, should have from .006 to .008 of an inch. The front and center main bearings should be relieved very generously, at least .015 of an inch end play on each side, so as to allow for the expansion of the crankcase.

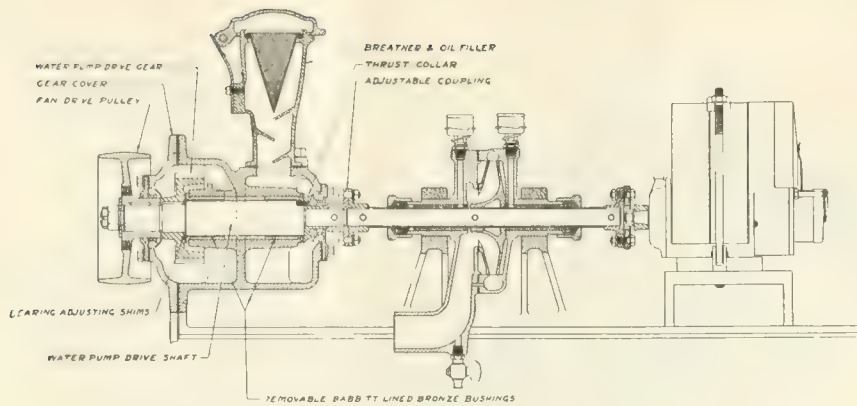
## Water Pump and Drive

The packing in the pump, when stuffing boxes leak, can be replaced by simply backing off nuts, care to be exercised that no hard substance be used to score the shaft. Graphited candle wicking will suffice for immediate repair; it would be advisable, however, to send to the factory for this packing as a special grade of packing is used in these pumps. The drive shaft for the pump also has provision for mounting the fan pulley and on account of the extra large bearing surface very infrequent replacement will be necessary.

## Cylinder and Heads

When it may be necessary to remove cylinder heads for removing carbon, grinding and replacing valves, great care should be taken in this operation. In order to insure a perfectly tight joint between the heads and the cylinder, the hold down studs in the center of the head should be tightened down first, then





Section through magneto, pump and fan drive

the outer row tightened, not in rotation, but opposite studs until all are tight.

It is good practice to dip or paint the gasket with a solution of white lead mixed with gasoline to a creamy thickness, or coat both sides with cup grease. Care must be taken not to get too much lead on the gasket so it will not squeeze into cylinder head.

### Compression

With the throttle valve wide open, the compression should be about 60 lb. when the engine is cranked at a speed of about 175 r.p.m. Inasmuch as the operator usually does not have a gauge, the evenness of compression may be checked on the cylinder by the swing back of the flywheel. If the flywheel is not exposed, the hand cranking will indicate the compression and any difference will be detected in the pull on the handle when the piston reaches the top of the stroke.

### Piston and Wrist Pin

The piston has three rings above the wrist pin. To put on rings, thin metal strips such as hack-saw blades will hold the ring from the piston and permit working the rings gradually from one groove to the next without springing them out of round. The blades, four in number, should be spread equally around the piston. The wrist pin is held in place by one of two methods. A screw is provided in the boss inside the piston which extends through the wrist pin. The screw is kept from backing out by means of a lock washer. As an added insurance, snap rings are set in the piston pin bore between the end of the pin and outside of piston circumference which prevents the pin from scoring the wall in the remote case of the screw backing out of the piston boss.

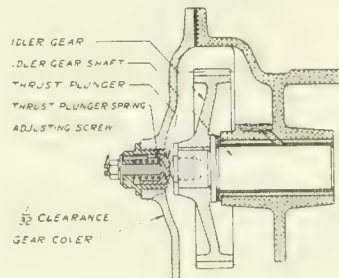
The other method is to clamp the wrist pin in the end of connecting rod by slotting the rod on one side. One side of the slotted rod is threaded and a clamp bolt draws the rod down on the pin. A slot in the pin, in which the clamp bolts fit, prevents the wrist pin from working endwise.

In putting the piston back into the cylinder, enter it from the bottom as the bevel at the bottom will permit entrance with less liability of damage to the pis-

ton rings. In replacing any machine parts such as pistons and pins, always make sure that they are free from burrs and grit.

### Push Rods and Adjustments

Push rods are provided for each valve; the cam on the shaft working through the push rods lifts the valve at the proper time to permit the gas to enter



Idler gear, showing thrust plunger

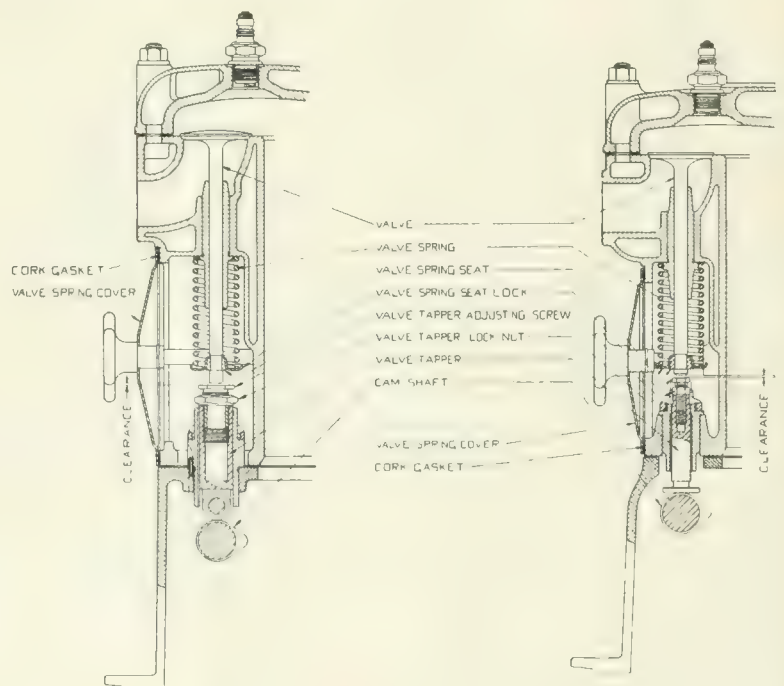
or be discharged from the cylinder. The push rods are of large diameter permitting of long wear and seldom need replacement. At the upper end of the

push rod is a screw and lock nut. The head of the screw is case hardened where it strikes the bottom of the valve stem and this prevents rapid wear. The screw is used to provide adjustment so that when the valve stem wears, the increase between the valve stem and adjusting screw can be taken up. A clearance of .004 in. should be provided on the intake and .006 in. on the exhaust when the engine is heated up and when the valve is completely closed. If less than this is used, the valves are held open when the valve stems have been expanded and there is leakage of compression and also the valve and seat may be burned so that it will have to be recut. A locknut maintains this adjustment until the wear causes a resetting. The valve timing is shown here.

The valve taper guides are inserted in the lower flange of the cylinder or top of the crankcase and are held in place by means of a forked forging, which in turn is kept in place by a single stud and nut, one forging to two valve taper guides.

### Grinding of Valves

When the valves become dirty or pitted, they should be ground. To remove them, first take out the port plugs, or remove the cylinder head. Lift up the springs with a compressor or bar or wood, taking out the keys at end of the valve stems. Use some of the reliable valve grinding compounds now on the market and spread the compound evenly over the surface of the valve face. Then place the valve back in its original position. The slots provided in the top of the valve will permit the valve to be moved back and forth, about one quarter turn, with a screw driver. Do not rotate the valve completely around with one motion as this tends to groove the seat. After having ground the valve with a few motions, raise the valve off



Section through valves and push rods



the seat and turn part way around, drop valve in seat and then start to grind again.

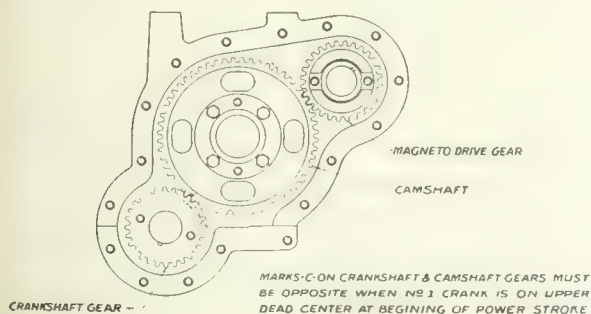
Clean the valves and stems thoroughly with kerosene, and in any event do not allow the grinding material to get into the cylinders or valve stem guides. Oil valve stems well before replacing.

## Camshaft and Idler Gear

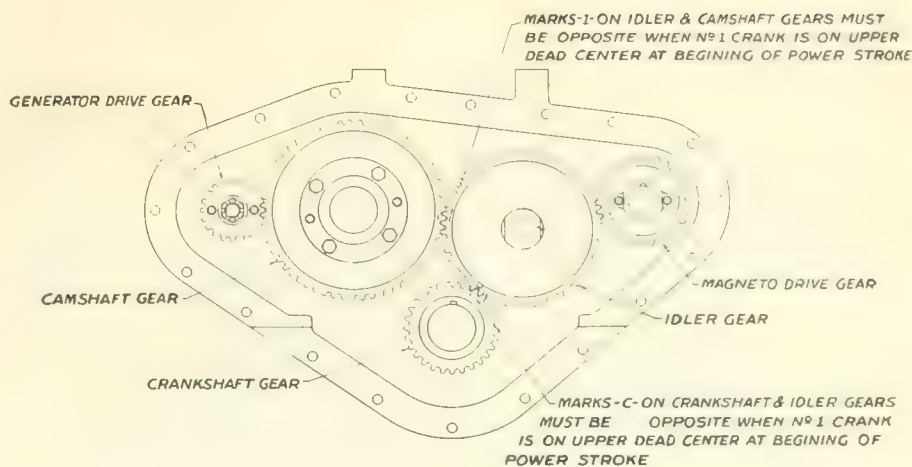
The Wisconsin engines being of the three point suspension have the front support part of the front cover of the engine. To remove the camshaft and idler gear, take off the front cover. The cams on the shaft will draw through the bearings so it will only be necessary to pull out the shaft as both idler and camshaft are held in alignment by spring plungers that come off with the cover. This method does away with bolts and nuts for retaining these two parts in the case. When replacing the camshaft, great care must be exercised in having the spiral gear that drives the pump shaft on the rear end of the camshaft mesh properly with gear on the vertical oil pump shaft. This can be accomplished by inserting a screw driver in the slot on the top of the pump shaft and working it back and forth until the gears begin to mesh.

## Ignition

To check the timing of the engine, open the priming cups on the cylinders and turn engine over by hand, holding a finger on top of the priming cup on number 1 cylinder (Number 1 cylinder is nearest to the gear end) until compression blows through priming cup under the finger. This indicates that the piston in Number 1 cylinder is coming up to the top of the stroke. Then to get the piston exactly on the upper dead center, turn flywheel so that line marked dead center 1 and 4 coincides exactly with indicating pointer put on the engine or bell housing for that purpose. Now retard the spark advance lever on magneto to extreme retard position. The retarded position is in the same direction as that in which the armature of magneto rotates. If the breaker on the magneto is not just on the point of opening, loosen the magneto coupling and turn the magneto shaft until the breaker is on the point of opening and bolt the coupling in this position. The wires leading to the spark plugs must now be connected. Locate the terminal on the magneto on which the distributing



Timing gear marking for types CAU and EAU



Timing gears marking for types TAU, UAU, VAU, RAU and RBU

brush is resting and connect this with spark plug in Number 1 cylinder. The other terminals taken consecutively in direction in which the distributor brush rotates must then be connected to the other cylinders in the order in which the cylinders fire. The firing order is 1—3—4—2.

## Spark Plugs

The spark plugs should be kept clean at all times, as this will prevent short circuiting. They should be screwed in tightly to prevent compression leaks. About .025 in. should be allowed between the firing points. The spark plug gap should be adjusted by bending the outside electrode, the position of the center electrode remaining stationary. Cracks in porcelain plugs may occur by carelessness in the use of the wrench which if it slips off and strikes the plugs may crack the porcelain, open it up and weaken the compression.

## Marking of Gears

If it should be found necessary to remove the timing gears, care should be taken to see that they are properly replaced. The marks on the crankshaft, camshaft and idler gears must line up as indicated in illustration at top of this page. This is very important as otherwise valve timing will not be correct.

## Oiling System

Proper lubrication is more important than any other one item. A great many engine troubles can be traced to lack of attention to the lubrication or to the use of inferior quality of oil. The best qualities of lubricants are none too good. It is advisable to use a slightly heavier oil in summer than in winter.

The Wisconsin Oiling System, as shown in the illustration, is of the force feed type, the oil being drawn by a geared pump from the sump in the lowest part of the lower base and forced through a cast-in-oil duct and drilled cranks to all connecting rod

and main bearings. A sufficient amount of oil is thrown off the connecting rods to thoroughly lubricate the pistons and camshaft, the camshaft bearings being provided with oil-pockets.

The oil is delivered from the pump to a main header and from the header by leads to each main bearing. The main bearings are fitted with oil grooves which distribute the oil. These grooves supply the oil to the connecting rod bearings through drilled holes in the crankshaft. The grooves in the bearings are slightly curved to prevent wearing ridges in the crankshaft.

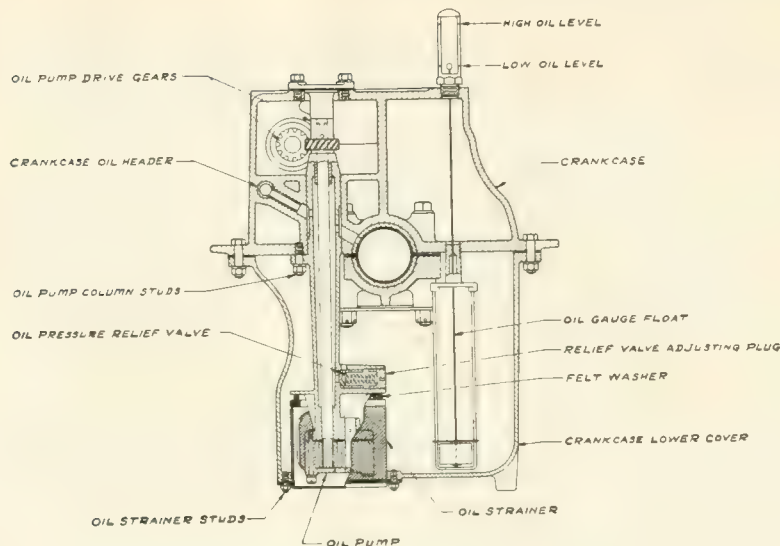
In engines using a force feed oiling system, it is recommended to use a medium oil. Medium oil will greatly increase the life of the engines. Lighter oils will not maintain the oil film in the bearings nearly as well, especially when the engines get hot, the result being more rapid wear or even burned out bearings.

The oil must be changed frequently especially if low grade fuels are used, part of which always dilutes the oil film on the cylinder walls, which in a short time affects the quality of all of the oil in the crankcase. The oil should be changed at least every 500 miles.

If the engine is not operated for a month or more, special care should be given to the cylinder to re-establish the oil film. To do this, remove the spark plugs and inject about one-fourth of a pint of oil in each cylinder and revolve by hand until compression is fully restored. If the engine is to be left standing over for a season, all external parts subject to rust and deterioration should be given a good coat of heavy oil or grease.

## The Oil Pump

The oil pump column on the types TAU, UAU, VAU, RAU and RBU engines is inclosed in the lower half of the crankcase and is bolted to the lower flange of the crankcase. The oil pump column need not be disturbed when removing the lower half of the crankcase. To remove the oil pump, drop the lower half of the crankcase, remove the three nuts which hold the oil pump in place and pull it out from the bottom of the case. The pressure of the oiling system



Section through oil pump, oil strainer and oil gage

is regulated by a spring operated plunger and is set to register 12 to 15 pounds at 1000 r.p.m. before the engine leaves the factory.

The oil pump on the types CAU and EAU engines is mounted on a pad on the outside wall of the lower half of the crankcase and is removed by simply removing the four nuts which hold the pump in place. The oiling system on these models is not provided with an oil pressure relief valve; the pressure will, therefore, not be constant but will vary

depending upon the speed at which the engine is run. At 1000 r.p.m. the oil pressure should not be less than three pounds.

### Oil Strainer

On the types TAU, UAU, VAU, RAU and RBU engines the oil strainer is located in the oil sump, being bolted to the bottom of the lower crankcase and extends up into the case inclosing the oil pump. The upper end of the oil strainer frame is provided with a felt washer

which is pulled up against a flange cast around the oil pump column.

On the types CAU and EAU motors, the oil strainer is attached to the flange of the oil pump body and extends into the oil sump in the lower half of the crankcase. To remove the oil strainer, simply detach the oil pump and the strainer can be drawn out with the pump. The oil strainer **MUST** be examined and cleaned frequently especially when the engine is new.

### Oil Gage

An oil gage extended through the upper case indicates the oil level at all times. The float carrying the oil indicator is guided by a metal gage and the float may be bobbed up and down to test if it is working freely. Distinct marks on the gage show high and low level and if the oil is maintained between these levels, no burnt oil smoke will be emitted and there will be sufficient oil to properly lubricate all bearings. The following list will give the amount of oil required to bring the gage to the high level mark:

Types	Size	Oil Capacity
CAU	3 3/4" x 5"	5 quarts
EAU	4 " x 5"	5 quarts
TAU	4 " x 6"	8 quarts
UAU	4 1/4" x 6"	8 quarts
VAU	4 1/2" x 6"	8 quarts
RAU	4 3/4" x 6"	12 quarts
RBU	5 " x 6"	12 quarts

## Clean Up Where You Can!

**T**HIS is the Marshall Field & Co.'s way of doing things. The big garage and service station in Chicago represents more than commercialism, system, efficiency, etc. The company deems it necessary that its employees be given a welcome change, a beautiful breathing space, something restful to the eye.

The two buildings shown in the accompanying illustration are surrounded on all sides by grimy streets, tenements and industrial structures of various kinds. The firm placed storage tanks for oil under the ground in this court and then decided to beautify the tract. The tanks are out of sight and the connecting pipes concealed from view. The green grass and beautiful array of shrubbery and flowers produce an artistic effect that well repays the expenditure.

This is only one of numerous ways in which to avoid disorder and unsightliness. Open spaces in front of garages are often used for the disposal of rubbish, etc. Quite often very good effort, so far as keeping a garage orderly and clean, is wasted, just because the man in charge thought the job completed with the disposal of the rubbish in some dump outside of the garage. The effect on the mind of the average mechanic

or driver usually is such as to hinder any further effort toward orderliness on his part.

The effort connected with cleaning up a garage or the outside premises can be made negligible providing nothing is left to collect. Things are bound to be left

promiscuously around the garage during the day and more so outside the garage. As a result, there should be an effort at stated periods during the day to clean up all articles that are not being used and to clean away all rubbish altogether.

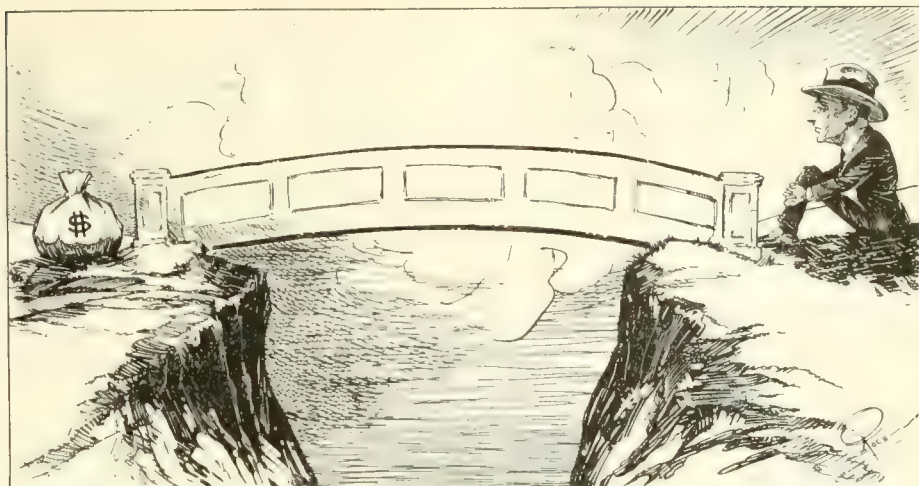




# Do You Play Bridge?

By

Sinclair Gluck



OLD Silas Gunther, president of the big commercial house, was as near showing his annoyance as he ever got. He leaned forward in his chair and brought his clenched fist down, very slowly and without sound, on the surface of his desk, a fact which, curiously enough, lent the gesture an added emphasis.

"Ross," he said, "How long has truck No. 3 been lying up in the garage now?"

The superintendent smiled wryly. "Four days, sir."

"Humph, four days! That's \$50 dead loss, plus the extra wear and tear on the other trucks doing extra work. There's something wrong somewhere!"

"Well, sir," Ross began, "You see she's broken a live axle shaft again. And I haven't another one in stock. I've combed the town for one, but there isn't one to be had. It's rotten bad luck, sir, but there's nothing to do but wait until we can get one from the factory."

Gunther, or Old Hammerhead, as the men called him, leaned back in his chair and smile dryly.

"Ross, when I said there was something wrong, I didn't mean that there was something wrong with the truck. We both know that. I meant that there was something wrong—elsewhere!"

Ross, the superintendent, looked his bewilderment at this.

Old Hammerhead laughed, suddenly, his annoyance vanishing in geniality. "My dear fellow," he said, "You handed yourself over to the enemy, horse, foot and dragons, in those last remarks."

He paused a moment, while Ross stared at him. "Don't you see, man?" he went on, "You said that No. 3 had broken a live axle shaft *again*. And you said that it was rotten bad luck. It wasn't, Ross. It was rotten bad management!"

He paused again, to let this sink in. Then he branched off, apparently at a tangent. "No. 3 is a Victoria truck, isn't it, Ross?"

"Yes, sir."

"And it's broken two live axle shafts now, hasn't it?"

"Yes, sir."

"And what about the other Victorias? Have they broken any live axles?"

"Well, sir, there have been quite a few mishaps with that part on the Victorias."

"How many?"

"About six, altogether, sir."

"Humph, and what sort of a stock of spare shafts have you kept on hand, Ross?"

"We usually keep the same number of each part, sir. That means about three of each. As soon as a part gets low, we re-order. But I couldn't tell that we were going to smash three in quick succession!"

"Now just there is where I think you are wrong, Ross. I think you could have guarded against this tie up. Because you had already been shown that the live axle shaft was a weak point on the Victoria. And all you had to do was to draw a simple deduction. Man, you knew that the Victoria has more trouble with that part than with anything else. And then you laid in the same number of spares of that part as of everything else. And you call that bad luck! I'm—I'm surprised at you, Ross!"

The superintendent looked down at the desk in confusion for a moment. Then he glanced up and caught the smile in the eyes of his boss. He smiled ruefully. "I guess it *was* pretty poor management, sir."

Old Hammerhead nodded. "Ross, let me tell you something. My wife had me up on the carpet the other night. Said I didn't take enough interest in things outside my work. Said I didn't have any diversion—well, the long and the short of it was that she and my daughter had it worked out between them that I should learn to play Bridge, so that I could play with them."

"They had the stage all set, too. They got a lady friend in, who plays a crack-erjack game and before I knew it, I was roped into learning the game. And I learned it too."

"But I learned it because I wanted to, Ross. Although I didn't tell them so, as it might have taken some of the joy out of the victory. You see, I got onto the fact that Bridge is more than a game. It's a science. And it's a science based on deduction. It's a case of 2 and 2 make 4. You see one 2 and by and by you see the other 2, and you have to work

out the 4 for yourself, do you see?"

"I played with my daughter while I was learning. She plays a good game herself. But, say, Ross, it was surprising how they beat us. I had good cards and I don't think I played them badly. But I couldn't seem to learn how to draw deductions. And that is where we fell down."

"And life is a good deal like that, Ross. I couldn't draw deductions, because I hadn't had enough experience in that game. But we've both had enough experience of life to draw deductions. And if we don't do it, we fall down. And somebody comes along who *can* draw deductions and beats us!"

"It's the same in looking after a lot of trucks. One make will give you a hint as to its needs, which may be quite different from the needs of another make. But if you don't take the hint, you fall down."

"You see, Ross, we're all of us liable to get into a rut. And that means that we're not alive to what is going on. And that means that we don't draw deductions. This oversight of yours is a good example of that. You probably thought it out a good while ago and decided that we'd keep three spares of each part on hand. You decided that that would cover the ground, so you installed that system, let it ride and forgot about it. Therefore, you weren't watching to see whether there might not be an advantage in modifying the system from time to time as new things came up. You didn't see the 2's as they came up, so of course you could not add them together to make the 4."

"But there's no such thing as standing still in life, Ross. You're either improving or deteriorating all the time. And that's why you want to watch for the 2's as they come along. What do you think about it?"

"I think you're right, sir. I think it was a pretty bad break, not having more shafts on hand. And I think—I think I'll learn to play Bridge."

Old Hammerhead smiled. "Not a bad idea, Ross. But I'll tell you a better one. Keep your eyes open all the time—and everywhere. And the desire to see all around you, will make you climb out of any rut, however deep!"

# Costs \$2.48 Per Mile—Saves \$7,000

## Short Freight Hauls With a 5-Tonner Show That Even With a High Cost Per Mile a Truck May Pay

HERE is a company which operates a 5-ton truck making 12 trips a day and travelling only an average of .78 miles per round trip. The result is that the truck costs \$2.48 per mile to operate.

Almost any fleet owner would say that a truck operating at the rate of \$2.48 per mile is not economical. Yet the truck has cut costs 45 per cent and has saved over \$7,000 per year.

In this article there is much food for thought for business men operating teams of horses on similar hauls. Cutting costs 45 per cent, even with truck costs so high, is a remarkable showing. And, considering the facts brought out in this example, it will pay anyone to investigate his own haulage proposition thoroughly before deciding that the cost of a truck is prohibitive or even uneconomical.

### Conditions Suggest Horses

The 5-tonner is operated by the Duquesne Oil & Supply Co., Pittsburgh, Pa. The company manufactures oil and grease for rolling mills and steel manufacturers. All the raw material comes into the plant by freight and 95 per cent of the products are shipped out by freight. The remainder is delivered to local customers.

The raw material, consisting of oils, fats, etc., comes in barrels. The product is also shipped out in barrels. So that the entire haulage problem is one of transporting barrels.

Up to September, 1920, the company used horses for hauling the raw material from the station to the plant and for delivering the finished product to the station.

Apparently the conditions were ideal for haulage by horse team. The station is only three blocks away, the loads are heavy and considerable time is spent in loading and unloading; to say nothing of waiting in line at the freight station. But the firm experienced so much trouble in obtaining satisfactory drivers that, against the advice of many friends, it decided to buy and install a motor truck for this haulage.

### —But Low Cost Per Barrel

The company states that during the three months which the truck had been in operation, at the time of writing, it gave so little trouble that the owners hardly knew they owned a truck. It averages 12 trips a day and carries an average load of 18 barrels each way.

The raw material coming into the plant weighs about 440 lbs. to the barrel, which makes the average load for the truck about 4 tons, on the way to the factory.

The finished product weighs about 560 lbs. to the barrel, making the average outgoing truck load about 5 tons.

Though the truck makes 12 trips a day, its daily mileage is only 9.38 miles.

This low mileage, together with the fact that the truck has one helper all the time and two helpers half the time, brings the cost up to the high figure of \$2.48 to the mile.

However, the cost per day is equally important. As shown on the cost sheet on page 283, it works out at \$23.29. This in turn works out at \$.0539 per barrel or \$.1361 per barrel-mile.

### The Commercial Vehicle—Truck Cost System

3 Month<sup>s</sup> ending \_\_\_\_\_ 19\_\_

Make of truck Selden Gasoline Electric

M. T. C. S. SUMMARY SHEET

L. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK

#### Operating Charges

Gasoline	301 gals.	\$ .36	\$ 108 36
Current	kw h		
Oil	13 qts.	\$ .275	3 58
Grease	lbs.		
Kerosene	gals.		
Waste	lbs.		
Dist. Water	gals.		
Driver	77 days	\$ 8	616 00
Helper	77 days	\$ 5	385 00
<i>1/2 time as extra helper for 77 days</i>		\$ 2.50	192 50
Mechanic	hrs		
<b>A—Total Operating Charges</b>			<b>\$ 1305.44</b>

#### Maintenance Charges

*Tires	722 miles	\$ .045	\$ 32 71
Repairs			
Overhauling, painting, etc.	Estimated @ \$.0606 per mile		43 75
Spare vehicle rental			
Garage rental (pro rata)	@ \$10 per month		30 00
<b>B—Total maintenance charges</b>			<b>\$ 106.46</b>

#### Fixed Charges

Insurance, fire	\$391.50	per year	\$ 97 87
Liability		per year	
Collision		per year	
Interest	6	(On Item 1)	90 70
Depreciation on chassis	Value \$5593.40		
Depreciation on body	Mile life—26,000		
Depreciation on equipment	\$21513 for 722 miles		167 94
*Depreciation on tires			
Total taxes and licenses	@ \$100 per year		25 00
<b>C—Total fixed charges</b>			<b>\$ 381.51</b>
			<b>1793.41</b>

\*Note: Omit one of these

One of the most interesting features of the above costs is the striking difference between the operating charges and the maintenance and fixed charges. Under normal operating conditions, all three types of charges should be approximately similar in amount. When one type of charge is out of all proportion to the others, as in this case, the truck is operating under abnormal and therefore uneconomical conditions.



But the previous hauling cost with teams amounted to \$.0964 per barrel. Thus with the truck, the company saves \$.0424 cents on every barrel hauled. And with a total of 432 barrels handled per day, this amounts to a daily saving of \$18.32 or a yearly saving of over \$5000. Thus with a truck, the cost per mile is very high, but the cost per barrel is much lower than before.

### Other Savings Effectuated

Another saving traceable to the truck comes from the increased efficiency of the yard labor which the truck has brought about. The company employs three men to get the barrels of finished product into the yard ready for loading onto the truck.

The actual loading is done by an electric hoist. Formerly these men were inclined to be slow, because hauling by horses was a leisurely business. But now

they have to keep the truck busy. As a result, their efficiency has been increased

### What the System Costs

On this page is shown a filled-in sample sheet of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

50 per cent. And since the company pays them \$6 a day apiece, or a total of \$18 a day, their increased efficiency is worth \$2,754 a year to the company, because it saves that much in extra help which would otherwise be necessary.

Moreover, having the truck available, the company is now able to haul its ashes and rubbish away and to do other odd jobs for which it formerly paid extra.

Altogether, the truck is saving, the company estimates, at least \$7000 a year.

### Surprising Haulage Performance

Taking into consideration the shortness of the runs and the length of the standing time involved in operating a truck in this class of work, this saving is surprising, to say the least. Almost everyone would consider such haulage as that of the Duquesne Oil & Supply Co. strictly a horse proposition. And apparently conditions were ideal for teams. For the freight station was only three blocks away, a considerable time was spent always on loading and unloading and, in addition, there were and are long waits in line at the freight station.

Yet a motor truck was put on the job and succeeded in cutting costs materially and saving a very considerable amount of money.

The principal outstanding feature of this cost analysis is that while the cost per mile operated is highly important as a check on the performance of the truck, it is significant only when compared with the cost of operating the same truck under the same conditions at some previous period, or when compared with the cost per mile of operating some other truck under exactly or very nearly similar conditions.

### May Save in the End

But when compared with the mileage costs of a truck operating under entirely different conditions, the cost per mile has no significance unfavorable to the installation of a truck. For, as this example shows, even a truck with a very high cost per mile operated may still save a great deal of money in the end.

In this case, as in all similar cases, the criterion on which the economy or otherwise of the truck must be judged, is the cost per unit, whether this be the cost per barrel hauled, the cost per ton-mile, per package-mile or per ton or package.

### More Buses for Detroit

DETROIT, May 15—New routes and forty additional buses will be put in service by the Detroit Motorbus Co. as quickly as the buses can be secured. The company has twenty-seven in operation and President R. W. Meade says that there had been an average of twenty-one in operation during the time the company has been in existence. Statistics officials say, reveal that the buses have traveled a total distance of 622,000 miles and have carried 2½ times the population of Detroit. The net profits for the period of operation are \$20,051.13.

### The Commercial Vehicle—Truck Cost System

Number of Truck A  
Capacity in lbs 10,000 Chassis No \_\_\_\_\_

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK

#### Investment

Cost of chassis, less tires	
Cost of body	\$ 593.40
Cost of equipment	
Cost of tires	453.30
1—Total cost, complete	\$ 6046.70

#### Performance Record

2—Days operated	77
3—Days idle	14
4—Days maintained (Item 2—Item 3)	91
5—Total hours operated	616
6—Total miles covered	722
7—Total trips made	924
8—Total <del>tons or packages or stops</del> <u>barrels</u>	33264

#### Performance Averages

9—Average miles per day maintained (Item 6—Item 4)	7.93
10—Average miles per day operated (Item 6—Item 2)	9.38
11—Average miles per trip (Item 6—Item 7)	.78
12—Average <del>tons or packages or stops</del> <u>barrels</u> per trip (Item 8—Item 7)	.36
13—Average commercial <del>ton-mile package-mile or stop-mile</del> <u>barrel-mile</u> per trip (Item 11 x Item 12) ÷ 2	14.04

#### Recapitulation

14—Total expenses for month (Sum of Items A and C)	\$ 1793.41
15—Cost per day operated (Item 14—Item 2)	23.29
16—Cost per day maintained (Item 14—Item 4)	19.71
17—Cost per mile operated (Item 14—Item 6)	2.48
18—Total commercial <del>ton-mile package-mile or stop-mile</del> <u>barrel-mile</u> (Item 7 x Item 13)	13172.96
19—Cost per commercial <del>ton-mile package-mile or stop-mile</del> <u>barrel-mile</u> (Item 14—Item 18)	\$ .1361
20—Cost per barrel (Item 14—Item 8)	.0539

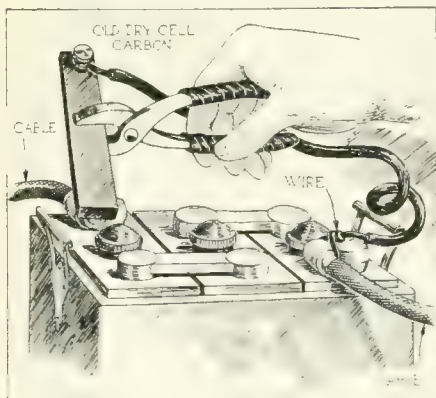
The above sheet shows the recapitulation of the costs on the big Selden truck, which operated at so high a cost per mile and still saved a big yearly sum for the company. The cost per barrel-mile is high, because of the low mileage, but in this case the cost per barrel is a better unit by which to measure the economy of operating the truck instead of the horse teams which previously handled this haulage work

# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 459—Removing Stubborn Battery Connection

A GOOD deal of difficulty will sometimes be experienced in removing a cable terminal from the battery terminal, when the battery has been in use for some time. If the cable cannot be removed with a moderate pull, the battery itself can be used to loosen the cable terminal. Take a carbon from an old dry cell and wire it up to the opposite pole of the battery. Then insulate the handles of a pair of pinchers and with the pinchers pick up the dry cell and bring the other end of it in contact with the stuck terminal. This will cause the terminal to heat up and expand and nine times out of ten this will loosen its grip on the cable terminal so that the latter can easily be removed with an ordinary pull.—SCOTT S. BOND, Hankinson-Nash Motor Co., Hattiesburg, Miss.



No. 459—Removing Battery Connection

**T**O help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

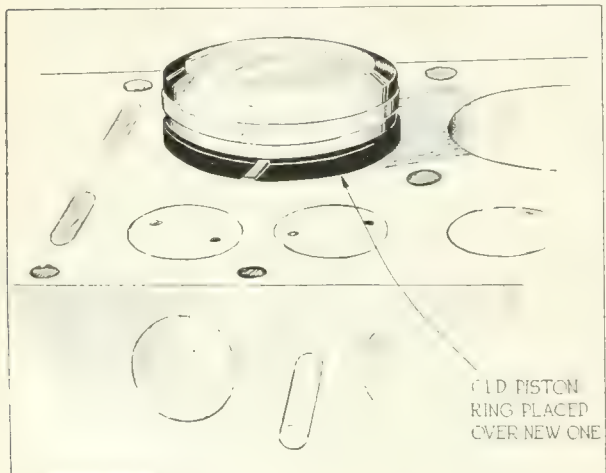
## No. 460—Another Ring as Piston Ring Squeezer

SUPPOSE it becomes necessary to inspect the cylinder walls of one cylinder and for that purpose it is necessary to remove the corresponding piston. The connecting rod cap is removed and the piston pulled down or pushed up out of the cylinder. When the inspection is

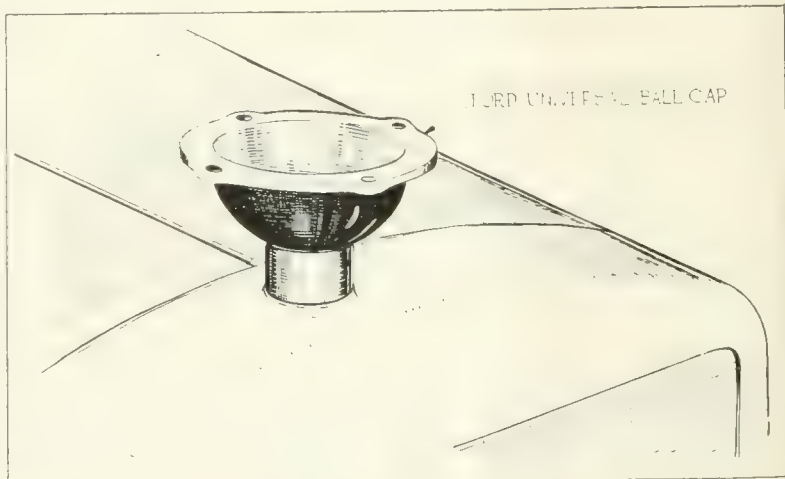
completed, the piston was, in this case, replaced from the top and the accompanying illustration shows an ingenious method by which the piston rings were squeezed one after another to permit the piston to pass into the cylinder. It was found, and will usually be found, that an old piston ring, if not too much worn, has sufficient power to squeeze another ring nearly shut, and an old ring was utilized in that way in this instance. In placing the old ring over the ring which is in position on the piston, the openings in the rings should come opposite each other.—E. J. BALMOS, Balmos General Repair Shop, Devine, Texas.

## No. 461—New Use for Ford Universal Ball Cap

THERE are very few truck parts which cannot be put to some useful purpose, even though they have outworn their usefulness in the work for which they were originally designed. Therefore, it is a pretty good rule never to throw away any disused truck parts until you are pretty sure that they cannot still be used in some way, either on the trucks themselves or around the shop. The accompanying illustration indicates a case in point. In this case a mechanic has adapted a Ford Universal Ball Cap Part No. 3369, which has otherwise outworn its usefulness, as a handy little funnel for pouring gasoline, oil or water. If desired, a spout can be soldered to the lower part of the ball cap, so as to pour into a smaller opening, but in the case of filling up radiators at least, this is not necessary.—E. J. BALMOS, Balmos General Repair Shop, Devine, Texas.

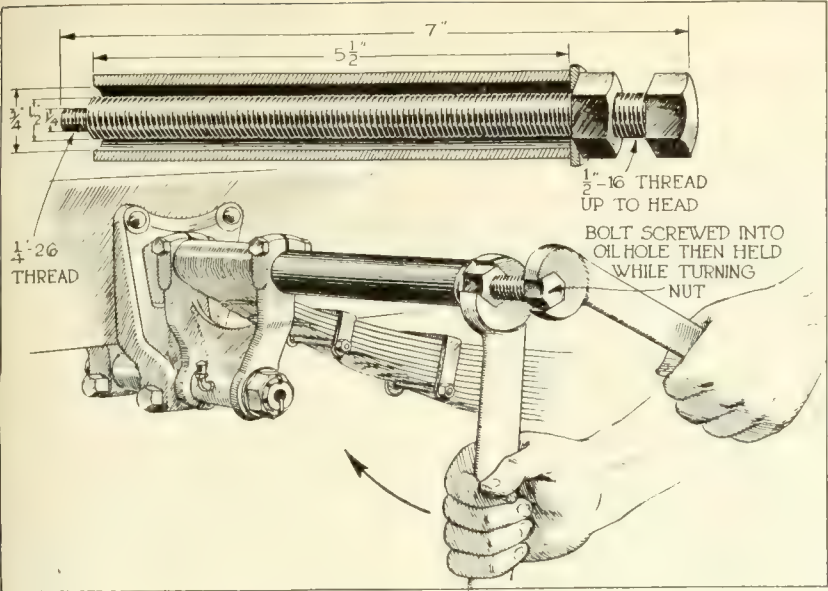


No. 460—Piston Ring Squeezer



No. 461—Ford Universal Ball Cap

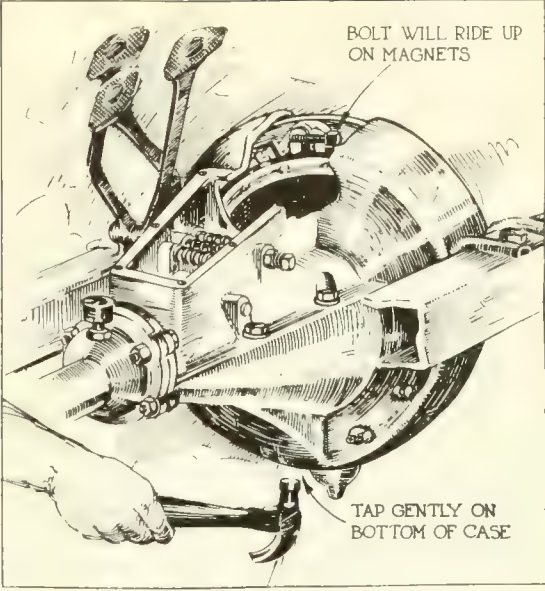




No. 462—Removing Spring Shackle Pins

**No. 462—Tool to Remove Spring Shackle Pins**

THIS is a home-made tool to remove "frozen" spring shackle pins which has proved very useful to the original designer. The tool is constructed as follows: Take a bolt 7 in. long and 1/2 in. in thickness. For 1/2 in. of its length, turn this bolt down in a lathe to 1/4 in. thickness and cut this small shank with a 1/4 in. die, 26 threads. Then cut a thread on the rest of the bolt all the way up to the head, 1/2 in. 16 threads. When this is completed, run a 1/2 in. 16 thread nut on the bolt up to about an inch from the head of it. Next take a piece of tubing or bushing 5 1/2 in. long, with an inside diameter 1/4 in. larger than the thickness of the pin to be pulled from the shackle. Assemble this with the bolt as shown in the illustration. Screwing in on the head of the bolt will screw the small shank on the bolt into the oil hole. The head of the bolt should then be held stationary with a wrench while the operator screws up on the nut as shown. This will draw out the obstinate shackle pin. The entire operation can be accomplished by one man in a few seconds.—FRANK STICKEL, Packard Motor Co., Long Island City, N. Y.

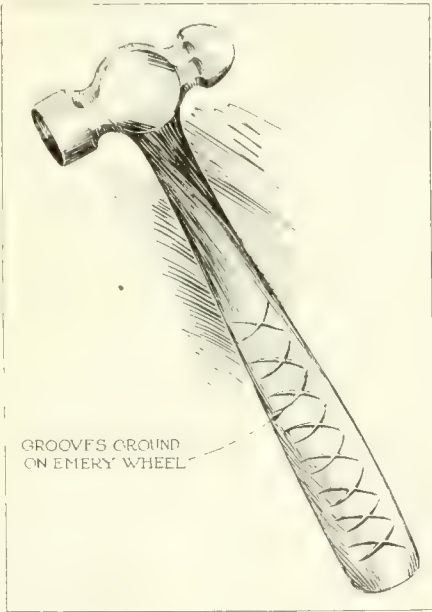


No. 463—Removing Small Parts

**No. 463—When Small Parts Drop in Flywheel Case**

WHILE adjusting the speed bands or relining the transmission bands on a Ford truck or salesman's car, small

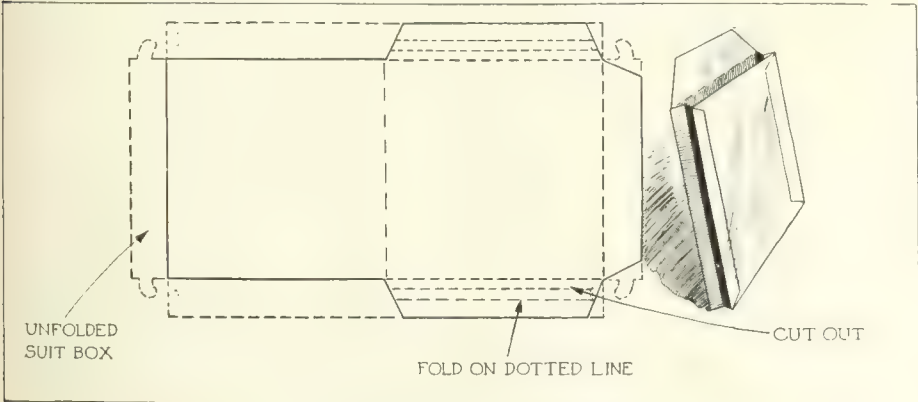
articles such as nuts, bolts, cotter pins, lock washers, small wrenches, etc., are apt to drop down into the lower half of the flywheel casing where they cannot be reached readily, and a good deal of trouble is experienced before they can be got out again. Here is a method, of course only applicable to the Ford, which will generally get the part out almost at once if the lost article is of metal and will so save a good deal of time and trouble. Suppose a bolt has dropped in the casing. Turn the flywheel over once or twice and then drain out the oil. Next, take a claw hammer and pound gently on the bottom of the case at the drain plug. Then turn the motor over as gently as possible at the crank and nine times out of ten the bolt will ride up on the magnets of the flywheel, where it can be reached with the hand.—WILLIAM H. BROWN, Chicago Telephone Co., Chicago.



No. 464—Hammer Handle Grip

**No. 464—Hammer Handle Grip Prevents Slipping**

TRUCK mechanics who handle greasy parts are often hampered in the use of a hammer by its slipping out of the hand. This often results in unnecessary damage. Scoring the handle of a hammer with criss cross lines prevents it from slipping from the hand when oily or greasy. The scoring is easily accomplished by holding the handle lightly against the corner of an emery wheel.—JOHN W. FERGUSON, Roanoke A. & E. Co., Roanoke, Va.



No. 465—Holder for Shop Cards

**No. 465—A Holder for Shop Cards**

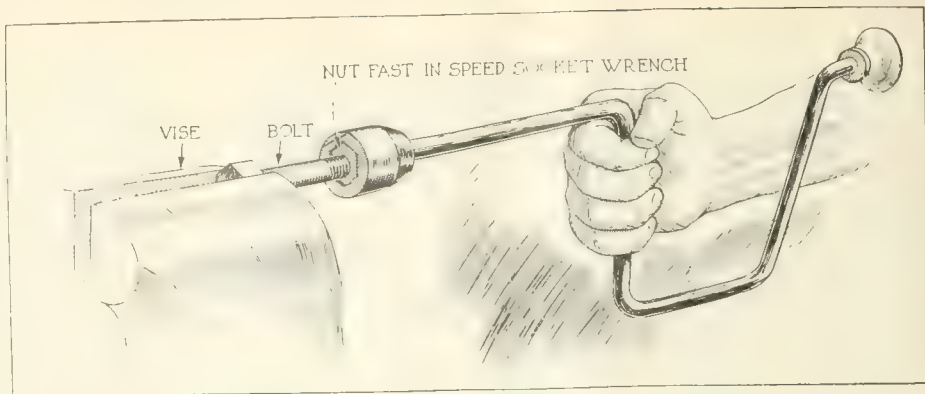
THE accompanying sketch shows a practical way in which to keep the shop records, etc. A holder is made by unfolding a suit box, cutting as shown, bending and gluing together. This is hung on any convenient nail and keeps the contents clean and in good condition.—ARTHUR G. RAABE, Long Island City, N. Y.

### No. 466—Old Ford Timer for Disassembling Plugs

HERE is a new use for an old Ford timer which can no longer be used for its original purpose and which has, therefore, been discarded. The timer is used for disassembling spark plugs, as shown in the accompanying illustration. For this purpose the Ford timer cover is cut out in the center to a hexagonal shape. This should be cut so as exactly to take the large hexagon nut on the spark plug. The timer cover is then attached to the wall of the repair shop or to a convenient place on the bench, with the large opening against the wall or bench. The cover is deep enough to allow you, then, to slip the bottom of the plug into the hexagonal opening until the large nut fits in place. Thus the timer cover will serve as a brace to hold the plug, while a wrench is used to unscrew the packing nut. The timer cover can be easily nailed or bolted to the wall or bench.—WALTER PFISTER, Grover Hill, Ohio.

### No. 467—Ford Rear Axle Bearing Sleeve Puller

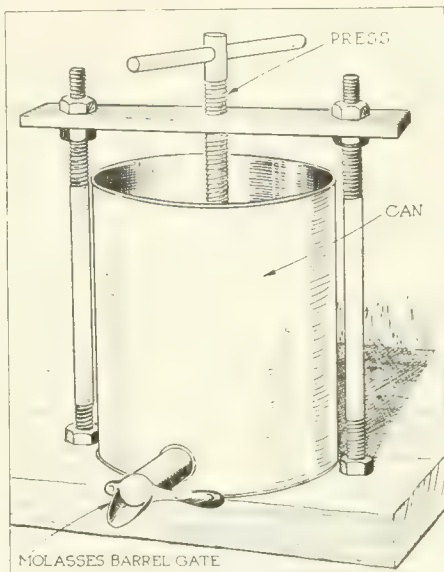
THE accompanying illustration indicates the method of constructing a device which can be used as a puller for the Ford rear axle. Most of the parts of this device can be made from parts which have been scrapped and which are around the shop. The grease cup is removed before pulling the sleeve. The illustration indicates the various parts of the device and their dimensions. Note that a hose clamp can be used to compress the new sleeve before it is inserted.—HERBERT A. FISKE, H. A. Fiske Garage, New Bedford, Mass.



No. 468—Removing Stuck Nut in Socket Wrench

### No. 468—Removing Stuck Nut in Socket Wrench

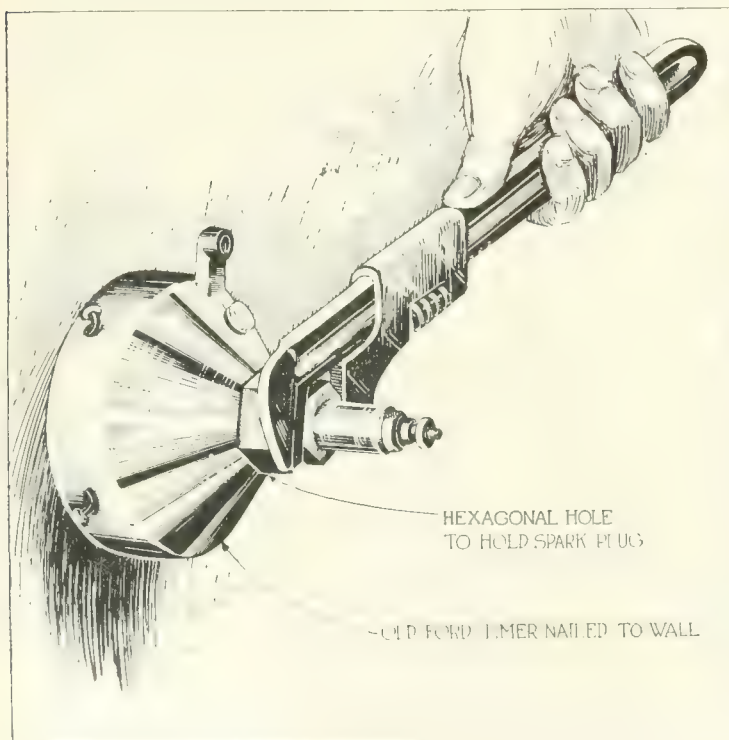
WHEN using a "speeder" brace socket wrench to take nuts off bolts, the nuts often stay in the socket due to dirt, or otherwise. Instead of pounding the socket against something or using a wire or screw driver to pull the nut out, screw a bolt into the nut and then grip the other end of the bolt in a vise. The nut can then be easily withdrawn.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.



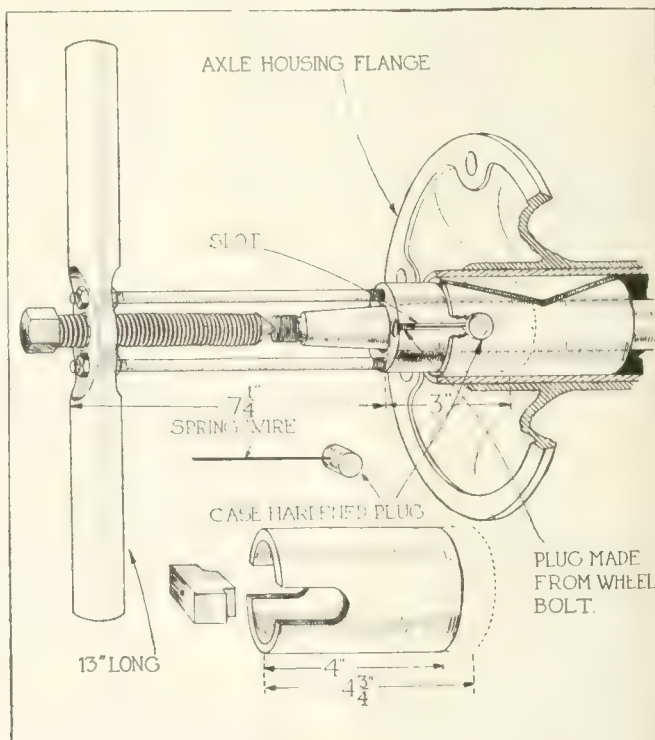
No. 469—Grease Dispenser

### No. 469—Paint Press As a Grease Dispenser

A LARGE paint pigment press equipped with a molasses barrel gate valve makes a good grease dispenser and has the added advantage of keeping the grease free of grit and dirt which is liable to get into open cans set around the garage floor.—ARTHUR G. RAABE, Long Island City, N. Y.



No. 466—Ford Timer for Disassembling Plugs



No. 467—Ford Axle Sleeve Puller



# Buyer's Department of The Commercial Vehicle

## Demountable Body

Made by Ideal Truck Equipment Co.

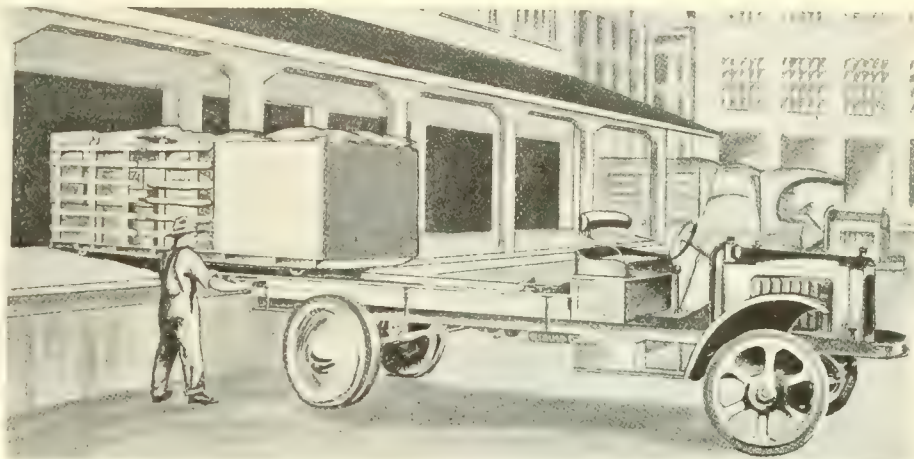
A MOTOR truck performs the work for which it was primarily intended only when traveling. As a temporary storage place for goods waiting to be unloaded the truck overhead cost is prohibitive and adds greatly to the cost of the goods. Conservative users of large truck fleets place a truck's overhead at from \$2 to \$3 per hour. In smaller fleets, the overhead, having less distribution, is probably heavier on each truck. But with the same overhead a truck actually in motion is performing a very valuable work.

Demountable bodies are divorcing entirely the function of loading and unloading from the function of transporting. The accompanying illustrations show the demountable body made by the Ideal Truck Equipment Co., Chicago. In operation the system is extremely simple, and practical. The bodies are loaded or unloaded while the truck is on the road. Ordinarily three interchangeable bodies are used with each truck, the entire equipment being considered a unit. Where goods are coming in and going out simultaneously (as in jobbing houses) more bodies to each unit are frequently used. Where city deliveries are handled exclusively, two bodies per unit are often sufficient.

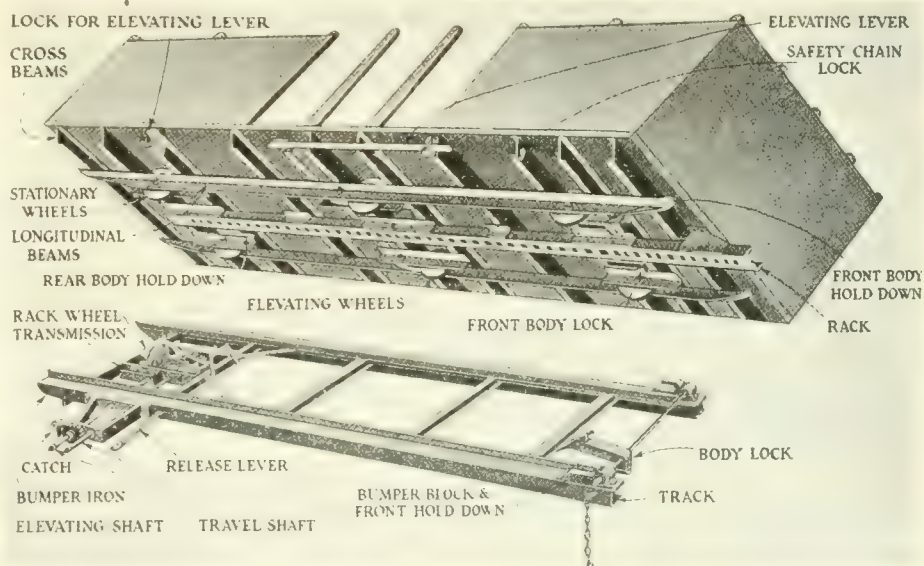
While the truck is busy conveying a loaded body to its destination the second body is being loaded at the warehouse; the third body is being unloaded at the destination. Three things are happening at the same time—loading, unloading and transporting. Upon arriving the truck discharges its loaded body, takes on the empty body and returns. The empty body is exchanged for a loaded one in a very few moments and the process is then repeated—keeping the truck and driver constantly engaged in actually moving goods.

For delivery work a similar arrangement is employed. While the truck and loaded body make the route the other bodies are being loaded and routed. As soon as the truck returns its empty body is quickly exchanged for a loaded one and it leaves again for the route. Early morning delays are eliminated and each truck puts in a full day every day.

At the warehouse an increased amount of goods can be handled with fewer employees and they can be handled in a more careful and methodic manner. Ample time is available for correct routing



*The Ideal demountable body is handled by one man*



*Constructional details of the Ideal demountable body*

ing and for careful loading. Goods can be properly placed for safety in transportation as well as accessibility in dividing the loading according to routing. This increased accuracy speeds up deliveries, shortens the stops, and reduces complaints by eliminating many of the errors that cause them. Employees are not required to work at breakneck speed part of the time, only to be idle at other times. Flexibility is a most desirable quality in the shipping department. This is particularly true in seasonable lines where the volume of business varies from time to time. To have adequate facilities for peak loads often means idleness of equipment over slack periods. Demountable body equipment, it is stated, brings a wider working range to care for slack loads and peak loads without discomfort or difficulty.

The unit consists of the gear mechanism which discharges or draws on the body, the double track for the chassis

and the underframes for the bodies. Each underframe has three small wheels on each side. The center one can be lowered with hand lever to permit hand trucking the body. Down the center of the underframe there is a cog track which is engaged by the gear mechanism for drawing on or discharging the body.

The body locks securely in place upon the truck by an automatic device. As the body moves onto the truck, heavy hooks attached to the chassis mechanism frame engage catches on the body frame securely holding the body to the truck chassis. To keep the body from sliding backward and disengaging from these hooks an automatic catch engages a steel latch on the body and keeps it rigidly in place until released by means of a lever near the rear of the chassis. A safety chain is slipped through a hole in the cross member of the body underframe and guards against insecure locking.



# Buyer's Department of The Commercial Vehicle

## New 2½-Ton Facto Truck

**Company Receives All Orders Direct from Purchaser—10 Per Cent Deposit Required with Each Order—Balance in Form of Sight Draft Against Bill of Lading**



*The Facto drag link is in line with the front spring eye. Note the simplicity of the mud-guard construction*

**A**CCESSIBILITY and a well balanced design feature the new 2½-ton Facto truck, which sells for \$2,895, f.o.b. Springfield, Mass. The Facto Motor Trucks, Inc., receives all orders direct from the fleet owner, a 10 per cent deposit being required with each order. The balance is in the form of a sight draft against the bill of lading.

Standard units include a Buda four-cylinder block engine with detachable head; Pierce governor; Zenith carbureter; Splitdorf Aero high-tension magneto with impulse starter; Bush vertical finned tube type of radiator with a ball-bearing suspension; Timken-David Brown worm-driven axle with a standard reduction of 7¼ to 1; Timken front axle; Ross steering gear; radiator guard and Smith metal wheels.

Standard equipment includes a Detroit weather-proof cab; two dash oil lamps; two gas headlights; Presto-O-Lite gas tank; rear oil light; mechanical hand horn; jack and full set of tools. The body weight allowance is 1,500 lb. The chassis weight is 5,800 lb. Solid tires are standard. Pneumatics may be had

at extra cost. Included in the equipment is a Facto designed hood catch which permits easy removal of the hood sides when access to the engine is necessary.

### FACTO SPECIFICATIONS

Capacity, tons .....	2½
Price .....	\$2,895
Wheelbase, in. ....	156
Tires, front solid .....	36x4
Tires, rear, dual, solid.....	36x8
Bore, in. ....	4½
Stroke, in. ....	5½
N. A. C. C. hp. ....	32.4
Speed, r.p.m. ....	1300
Speed, m.p.h. ....	18
Final drive .....	Worm

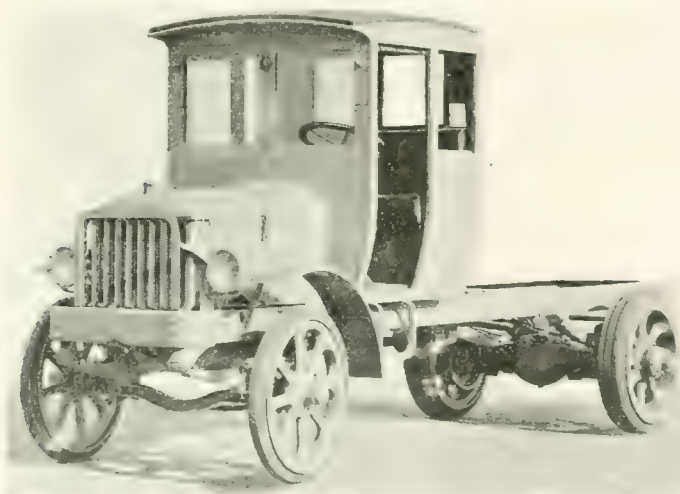
The engine is made easily accessible by removing the front cross member of the frame. Straight line drive from the powerplant is accomplished by hanging the engine low on the front cross frame

member. The drive from the four-speed gearset is in a straight line when the truck is loaded, two sets of Spicer universal joints being used.

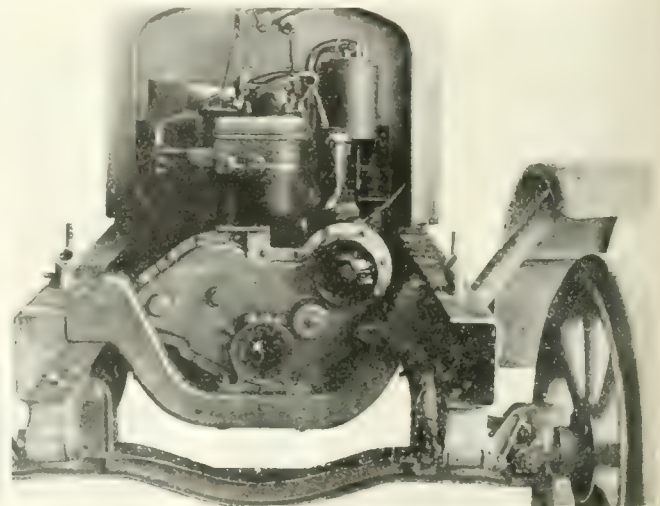
The steering gear can be removed by disconnecting the drag link, removing four bolts on a split bracket and pulling up through the cab. The drag link is in line with the front spring eye which makes for easy steering. The turning radius is 27½ ft.

The Facto company has equipped its truck with long rear spring shackles fitted with oversized oilless bushings. The rear bushings are 1¼ by 3½ in. in size and the front 1 by 2½. The springs are of chrome manganese steel, heat-treated, of the banded type with no center bolt. The rear springs are 56 in. long and 3½ wide and the front 41 by 2½.

Both the hand and foot brakes operate on the rear wheel drums. The frame is of pressed carbon steel ¼ in. thick and 6½ in. deep.



*Facto 2½-ton truck with weatherproof cab, headlights and radiator guard as standard equipment*

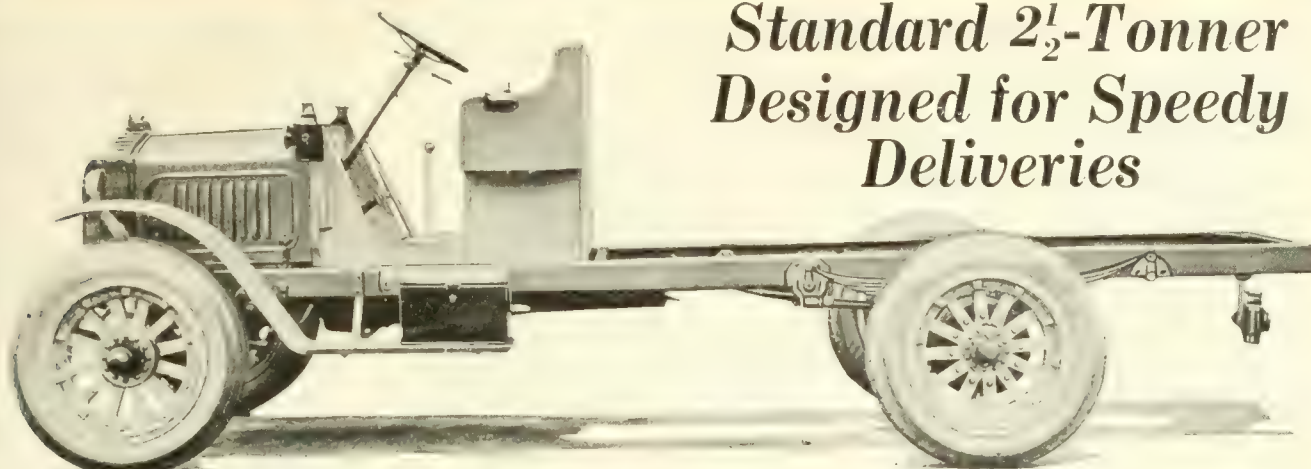


*The engine is made easily accessible by removing the front cross member of the frame*



# Buyer's Department of The Commercial Vehicle

## Standard 2½-Tonner Designed for Speedy Deliveries



**T**HE new Model 1-K 1½-ton Standard worm-driven chassis has been designed to meet the demand for a light truck having speed and flexibility without sacrifice of stamina and durability. With ample load capacity it is suited for any agricultural or industrial duty.

Like the other Standard models, it is made up of well-known units, including a Continental Red Seal engine, Timken axles and bearings, Brown-Lipe clutch, control and gearset, Spicer universal joints and driveshafts, Eisemann magneto, Stromberg carbureter, Ross steering gear, Detroit Pressed Steel frame, Long radiator, Standard Parts springs, and Spicer universal joints.

The radius rods and fittings are so constructed that any wear can be easily offset by simply tightening a few bolts.

Ample provision has been made for mounting any type of rack, stack or dump body mechanism. The dimensions

### STANDARD SPECIFICATIONS

Capacity, tons	1½
Price	\$1,950
Wheelbase, in.	134
Tires, front	34X3½
Tires, rear	34X5
Bore, in.	5½
Stroke, in.	5
N.A.A.C.C. hp.	22.5
Speed, rpm.	1200
Speed, mph.	17
Gear ratio in high gear	7.2 to 1
Final drive	Worm

of the frame back of the driver's seat are 120 in. long by 32 in. wide. When a passenger bus body is to be mounted, the seat and dash assembly can be easily

taken off. The front end of the body can then extend flush with the engine hood.

The four-cylinder powerplant is a unit with the three-speed gearset. The cylinders are cast in block with the valves placed at the right. Water is circulated by a centrifugal pump through a vertical finned tube type of radiator. The engine is lubricated by a splash-pressure system in which the oil is sent to the crankshaft bearings and timing gears by force feed and to the pistons, camshaft and push rods by splash. Ignition is taken care of by a single high tension magneto with fixed spark control. A Monarch suction governor is used to regulate the engine speed.

Propulsion is taken through the radius rods and driving torque through springs.

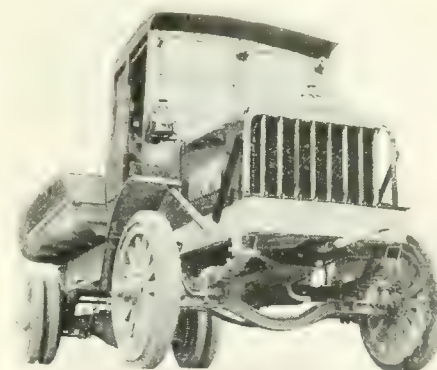
## G. & J. a Newcomer in the Motor Truck Field

**A** NEWCOMER in the Canadian truck field is the G. & J. truck made by the Gotfredson & Joyce Corp., Ltd., of Walkerville, Ont. This truck has been designed particularly to meet the conditions typical of Canadian transportation and has been under test for about 14 months.

Production of the 2-ton G. & J. truck began on a small scale in the fall of 1920 in the Walkerville plant. The designs of the 3½-tonner have also been completed and were put on exhibition at the Windsor, Ont., show in the latter part of February and this model is now also in production.

It is also purposed to bring out a light, 1-ton model, and eventually a 5-ton model. The specifications of the 3½-ton G. & J. truck which is the latest model to be put in production, are typical of the entire line, except the 1-ton, which will be different in every respect, but on which information will not be available until during the summer. The powerplant is the Hinkley Class B truck type engine, which, in conjunction with

the conventional, worm-drive, Timken-Detroit axle gives a foundation for the design of the truck. The engine is a 4½ by 5½ in. bore and stroke developing 50 hp. on the brake. This engine is familiar to the trade, being the stock Hinkley production.



*New 3½-ton G. & J. which is assembled with standard units*

The other units in the truck include the Brown-Lipe transmission with four speeds mounted amidship on frame crossmembers with provisions for a tire pump and power take-off. This transmission is mounted on Timken roller bearings and employs nickel steel gears throughout. Spicer propeller shafts with enclosed universal joints are employed, providing a straight line drive from the engine to the rear axle. The frame is rolled, channel steel, hot-riveted and reinforced with gussets. The depth of the channel is 7 in. and the width of the frame 38 in. The height from the ground to the top of the frame is 35 in. under average load. The road clearance under the front axle is 9½ in. and under the rear axle 9 in. The front wheel tread is 66½ in. and the rear wheel tread 65¼ in. The overall length is 245 in. and the width over the rear hubs is 86¼ in.

The chassis price on this model is \$5,175 f.o.b. Walkerville. The chassis price on the 2-ton model is \$3,850 f.o.b. Walkerville.



# Buyer's Department of The Commercial Vehicle

## Yule Hoist and Body

THIS equipment has been designed for hauling ashes, etc., in narrow alleys and in crowded thoroughfares. The hoist and body is built especially for the Oldsmobile Economy truck. The hoist is positive, rapid and easy to operate. A capacity load can be dumped in less than 1 min. All gears are concealed. The body may be elevated to an angle of 50 deg. By means of an automatic ratchet the body is always under control and may be securely held at any desired angle and the load either spread or dumped in one place. With the ratchet released the body returns to normal position by gravity and without jar. Because of the straight sides, the double acting tailgate equipped with a spreading device and extension steel sideboards, the body may be used as a dumping unit for gravel, concrete, brick, stone, ashes, coal, etc., or as either an express or stake body for boxes, lumber, bar iron, etc. When gravel, concrete and other heavy materials are to be handled it holds the truck capacity without the use of the steel extension sides. When lighter materials are handled the truck capacity is secured by using the steel side extensions which are quickly and securely attached and for which no extra charge is made. This equipment is made by the Michigan Bridge & Pipe Co., Lansing, Mich.

## Tell-U-Motor-Meter

THIS instrument tells how much fuel is used during the season, how much gas is in the rear tank, and how many miles per gallon are being made.

It is combined with a standard type of speedometer and the combination—which has appropriately been called the "Automobile Book-keeper"—gives a continual check on the truck performance. There is only one extra connection; namely, a pipe running from the instrument to the top of the vacuum tank. The speedometer flexible shaft, which is on the truck, operates the speedometer. The makers are Thompson & Stuber, Rochester, N. Y.

## Duken 1-Man Service Outfit

THIS outfit was designed for the handling of wrecks. It is built of 3 by 4 angle steel, strong enough to handle any light truck. The company also makes a heavy model for trucks above 2 tons. The light model can be mounted on any body in a short time and dismantled just as easily. The cost, ready for mounting, is \$145. This model includes a worm gear winch and a 3/8-in. steel hoisting cable, arranged for single, double or triple pull. It may be applied direct from the winch to move a vehicle from a distant ditch. The maker is the Duken Service Crane Co., Chicago.

## Truck Accessories

### Tiremeter

A TUBE is now being marketed which takes all the guess work out of inflation, for instead of the ordinary air valve it has what is called a Tirometer, a combination air valve and air pressure gage. The Tirometer shows accurately at all times the exact air pressure in the tire. It is protected from oil, dirt, etc., by a transparent and unbreakable dust cap, which does not in any way interfere with the instant reading of the gage.

The tube is a pure gum tube, full laminated construction, made with special preservative. It is made in both red and gray up to and including 37 by 5-in. sizes. In the 36 by 6, 38 by 7 and 40 by 8-in. sizes the tube is red. Prices range from \$4.80 for a 28 by 3-in. size to \$9.75 for a 37 by 5-in. in the gray tubes. Red tube prices are a little higher. The maker is the Currie Bros. Co., 209-12 Grand Bldg., Atlanta, Ga.

### H-E-C Spark Intensifier

DELIVERY of an intensely hot spark at all speeds gives complete combustion of the fuel. The makers of spark intensifiers in the past, as well as in the present, have all made this a leading sales point in bringing the merits of their products to the attention of the public. The latest intensifier is the H-E-C, which operates on the well known spark jumping principle. The gap makes the spark hotter and more intense. In the case of the H-E-C, the adjustable spark gap is visible, thus aiding in locating ignition trouble immediately. This intensifier will fit any plug. The list price is \$1 each. The maker is the Hercules Electric Corp., Boston.

### Ideal Reserve Valve

THE Ideal reserve valve works as follows. When the tank is full, the feed is from the shorter tube; when the level falls below this point, the supply is stopped until the reserve valve is opened. The feed is then through the longer tube which extends to the bottom of the tank. A gasoline gage is included with the device. It is made of brass finished with nickel. The price is \$5.50. The maker is the Ideal Brass Works, Indianapolis.

### Rear View Wind Deflector

BENZER rear view wind deflectors are fully adjustable and will withstand rough usage, being made of plate glass, 1/4-in. thick with 1/2-in. bevel. They give the advantage of deflectors plus the benefit of rear view mirrors ground into the glass. The maker is the Benzer Corp., Brooklyn, N. Y.

## Dayton Airless Tire

IMPORTANT changes in the construction of the Dayton airless tires have, it is stated, added to the wearing qualities. The tire is built with piers of rubber set about 1 in. apart and vulcanized as parts of the tire itself. These piers take the place of an inner tube. They were formerly made of one kind of stock, but now they are made of what is known as two-stock compound. The lower half, or base of the pier, is made of a compound that adds strength to the side walls and is of sufficient density to prevent rim cutting. The upper, or outside half, of the pier is made of much more resilient, shock-absorbing rubber, adding greatly to the easy-riding qualities of the tire. As a result of this new construction, the new Dayton tire without a load indicates a depression of approximately 14 per cent, whereas with the old construction the deflection was approximately 6 per cent. Other changes include a new breaker strip to eliminate tread separation; and a new tread giving a wider bearing surface on the road. The maker is the Dayton Rubber Mfg. Co., Dayton.

## Apco Shock Absorber

THE Apco shock absorber for Fords has been designed with the idea of long life, and to accomplish this twelve hardened steel bushings are used in each set and provision is made to take up the wear by means of castellated nuts. Sidesway is eliminated by a patent side link. The Apco comes complete ready to put on the vehicle. The list price is \$20 for a set of four. The maker is the Apco Mfg. Co., Providence, R. I.

## I. C. U. Products

AMONG the twenty-four products made by the Livingston Co., New Haven, Conn., are gasket cement, neatsfoot oil, and nickel polish. The gasket cement is suitable for all work on gasoline engines, making a compression-tight job.

## Gates Radiator Hose

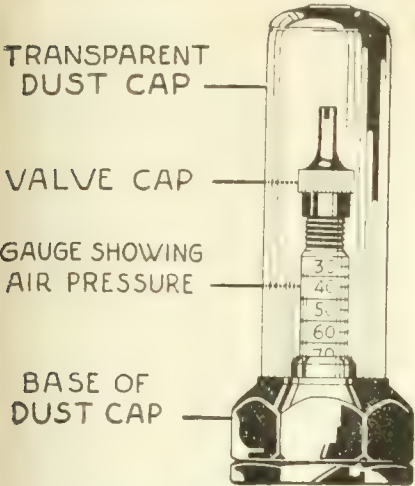
A RADIATOR hose with a tubed center without seams or laps is the latest Gates product. This construction, it is stated, prevents separation of the rubber and fabric through the action of hot water and steam. The Gates Rubber Co., Denver, has also prepared a special radiator hose and fan belt chart, showing the sizes and lengths.

## Magic Cloth

THIS is a specially treated cloth which is used to clean off the windshield in rainy weather. The size is 10 in. square and the price is \$1. The maker is John D. Becker, Gettysburg, Pa.



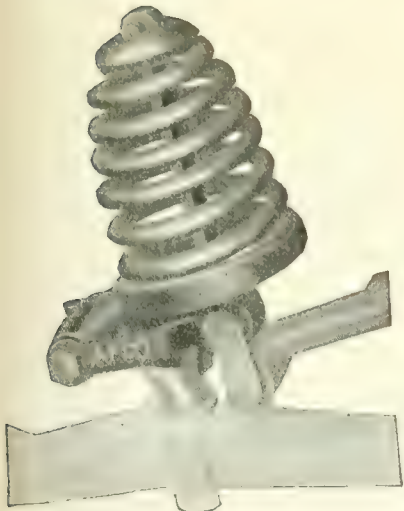
Buyer's Department of The Commercial Vehicle



Tiremeter



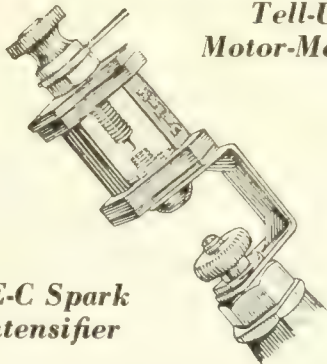
Duken 1-Man Service Outfit



Apco Shock Absorber



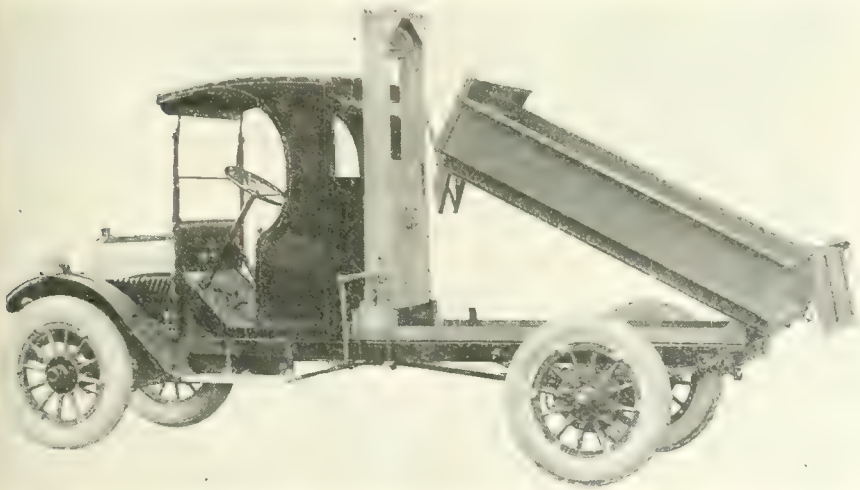
Tell-U-Motor-Meter



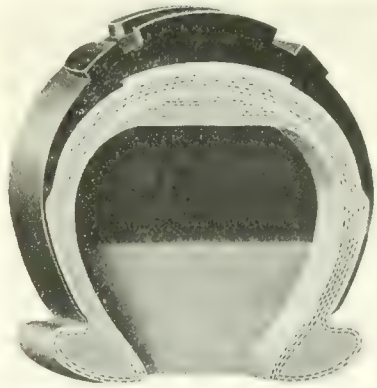
H-E-C Spark Intensifier



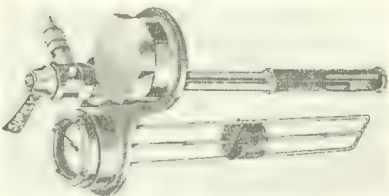
Rear View Wind Deflector



Yule Hoist and Body



Dayton Airless Tire



Ideal Reserve Valve

# Buyer's Department of The Commercial Vehicle

## Duby Wheelgage

IN using the Duby wheelgage the spring is compressed and ends of the gage are placed against the inside of the tires or wheels at a sufficient height so the ends of both chains barely touch the floor. After taking the reading in this position the gage is held in place by pressure of the spring, while the truck is moved forward until the ends of the chains again touch the floor at the back of the wheels, where, by an ingenious arrangement the reading can be taken from the same position in front of the truck.

As the gage is not removed from the wheels between the two readings and the chains make it possible for the operator to be sure that both readings are taken at the same height it can readily be seen that all chances of mistakes have been eliminated. The list price is \$10. The maker is the J. F. Duby Co., 9 River Street, Mattapan, Mass.

## Knok Tector

OF very recent invention is the Knok Tector, an instrument devised principally for use in locating trouble in gas engines or bearings or gears or anywhere in the truck. The idea in using this instrument is to ascertain accurately the origin of sounds which are made by some moving defective part of the mechanism. The Tector looks very much like a doctor's stethoscope. The binaural is placed to the head and when properly placed the operator will be able to hear only the sounds transmitted directly through the tubes from the tector. It is made by the E. R. Benson Mfg. Co., Portland, Me. The price is \$5.

## Koehler Valve Facing Tool

THE cutter on the Koehler valve facing tool is adjustable to any size or angle valve. The handle clamps over the stem of the valve without marring it. The tool can be set to cut the bottom of the valve to any desired width. The price is \$10. West of the Rockies the price is \$10.50. The maker is the Ridgar Metal Products Co., 620 Consumers Bldg., Chicago.

## D-A Lubricant

THIS is a lubricant for the gearset and differential gears. It is a Pennsylvania oil, containing no animal fats or grease, and thus, it is claimed, will not melt or run out under high heat or "channel" in cold weather. This lubricant clings to the gears, acting as an elastic cushion between the teeth or worms of the gears—quiets the gear, protects the metal surfaces, and prevents friction. The maker is the D-A Lubricant Co., Indianapolis, Ind.

## Shop Equipment

### Body Iron Assortment

A COMPLETE set of body irons designed to aid the owner in making a slip-on truck body in a few hours is included in the Bonney assortment. Instructions for the construction of a body for a Ford runabout are enclosed with each set, and the dimensions can be modified for any other motor vehicle. The price east of the Mississippi is \$6—in the west it is \$6.50. The maker is the Bonney Forge & Tool Works, Allentown, Pa.

### Crane Bench Drill

A HANDY bench drill which will have a capacity of 5/16-in. drills, is being manufactured by Harold G. Crane, Adrian, Mich. The spindle of this drill is full-floating, being relieved of all belt strain. The bearings used are large double annular ball bearings and the belt is tightened by means of a thumb-screw adjustment. The motor is the vertical type, 1750 r.p.m. for alternating or direct current as specified, and 220 or 110 volts.

The switch is located on the side of the drill press which is equipped with 10 ft. of heavy cord with plug. This drill press comes ready for use and can be plugged in on any lighting circuit. The head with the motor attached can be lowered and swung through 180 deg., allowing the drill to clear the base. The price complete is \$150.

### "Hury-Kane" Plug Cleaner

FIVE seconds to clean a spark plug is the time claimed by the maker of the "Hury-Kane" designed especially for this work. Compressed air in combination with sand placed in the cleaner is the method used. The plug is held firmly in place at the top of the device, air is applied to the nozzle at the bottom of the cleaner by a permanent attachment with lever control. The sand is blown upward with force enough to clean the dirtiest of plugs, according to the maker of the device, the Brewer Specialty Corp., 2453 Wabash Avenue, Chicago. The list price is \$12.

### C-O Straightening Press

THE C-O straightening press No. 2 is used for shafting, camshafts, crankshafts, rear axles, etc. It is furnished either with or without a standard test dial indicator. The capacity is 8 tons and the distance between centers is 72 in. The net weight is 225 lb. The price is \$73.70. The maker is the Canedy-Otto Mfg. Co., Chicago Heights, Ill.

## Giant Pneumatic Tire Vulcanizer

CURING of 6, 7 and 8-in. pneumatic truck tires on the type "S-8" Zwebell vulcanizer is made possible by the split aluminum reducing shell. Each half of the 8 to 7-in. reducing shell weighs approximately 22 lb., and each half of the 7 to 6-in. reducing shell weighs approximately 18 lb. As aluminum radiates heat three times more quickly than iron, the curing surface of this 8 to 6-in. aluminum reducing shell comes to a maximum heat as quickly as a 3/4-in. iron reducing shell.

One pair of straight side bead molds are furnished with each outfit. These are heavily ribbed on the top side and have two bolts holding them together, preventing them from falling off when putting tires in or taking them out of the mold.

The "S-8" combination sectional mold is furnished either with or without boiler. The outfit mounted on the boiler is shown in the accompanying illustration. Factory tests show that this outfit will steam to 50 lb. in 50 min.

Special attention has been given to steam circulation. In order that the mold be evenly heated, a 1 1/4-in. steam chamber has been provided. The maker is the Zwebell Brothers Co., Milwaukee.

## Washburn Torch and Equipment

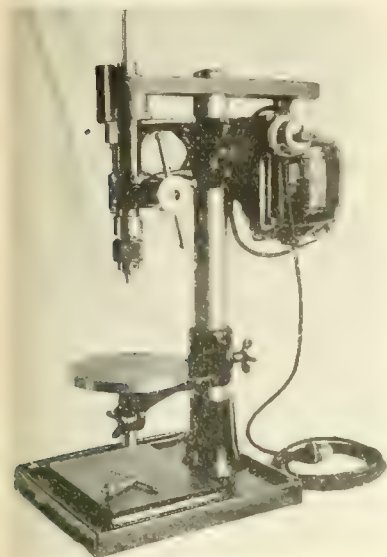
THIS operates on Prest-O-Lite gas and air, and burns fifteen parts of air to one of gas. It is instantly adjustable up to 5300 deg. Fahr. The needle point is a feature of the equipment. In this flame point the Washburn torch concentrates about all the heat a simple combination of acetylene gas and air is capable of producing. The flame always retains its needle point. A brass, needle-pointed flame distributor is so located within the enclosing shell that the distributor point can never all be below the temperature of combustion. Because of this the flame does not readily pop out. The fuels are mixed perfectly by the mixer supplied with the torch. The maker is the Washburn Burner Corp., Kokomo, Ind.

## Rysco Grease Gun

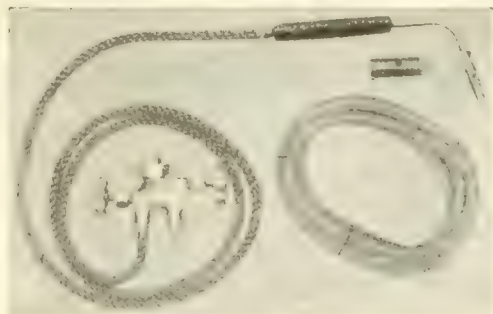
THIS gun is made of heavy brass castings and cold rolled brass tubing, and is fitted up with machined pressure screw and rigid plunger. It holds 3 lb. of grease at one filling. Cup leathers prevent the grease from oozing out from behind the plungers. It is easily filled from the top. The handle is adjustable for increasing or decreasing leverage. Its weight is 5 1/4 lb., and the price is \$7.50. The maker is the Railway Specialty Co., Atchison, Kan.



# Buyer's Department of The Commercial Vehicle



*Crane Bench Drill*



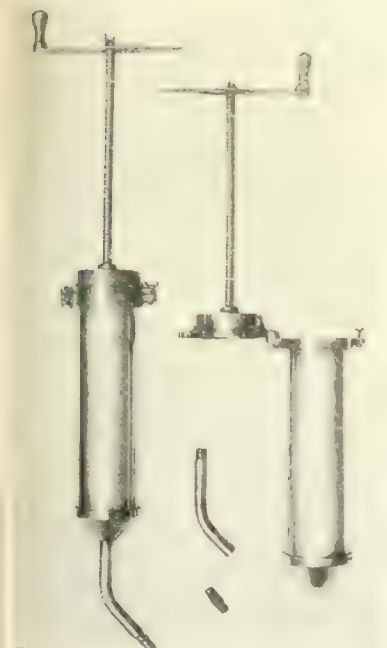
*Washburn Torch*



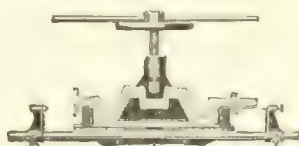
*Body Iron Assortment*



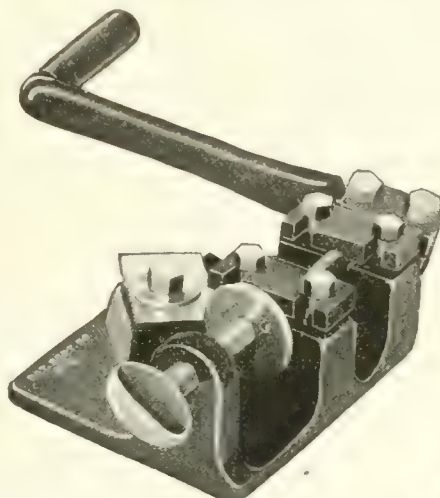
*"Hury-Kane" Plug Cleaner*



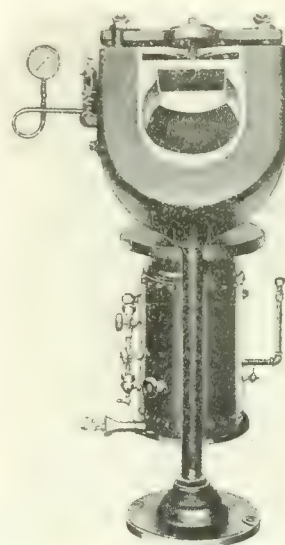
*Rysco Grease Gun*



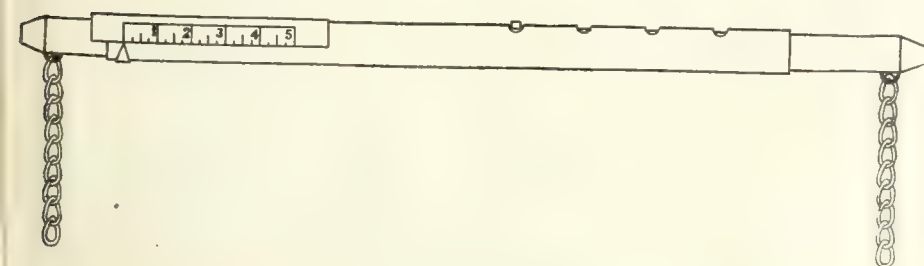
*C-O Straightening Press*



*Koehler Valve Facing Tool*



*Giant Tire Vulcanizer*



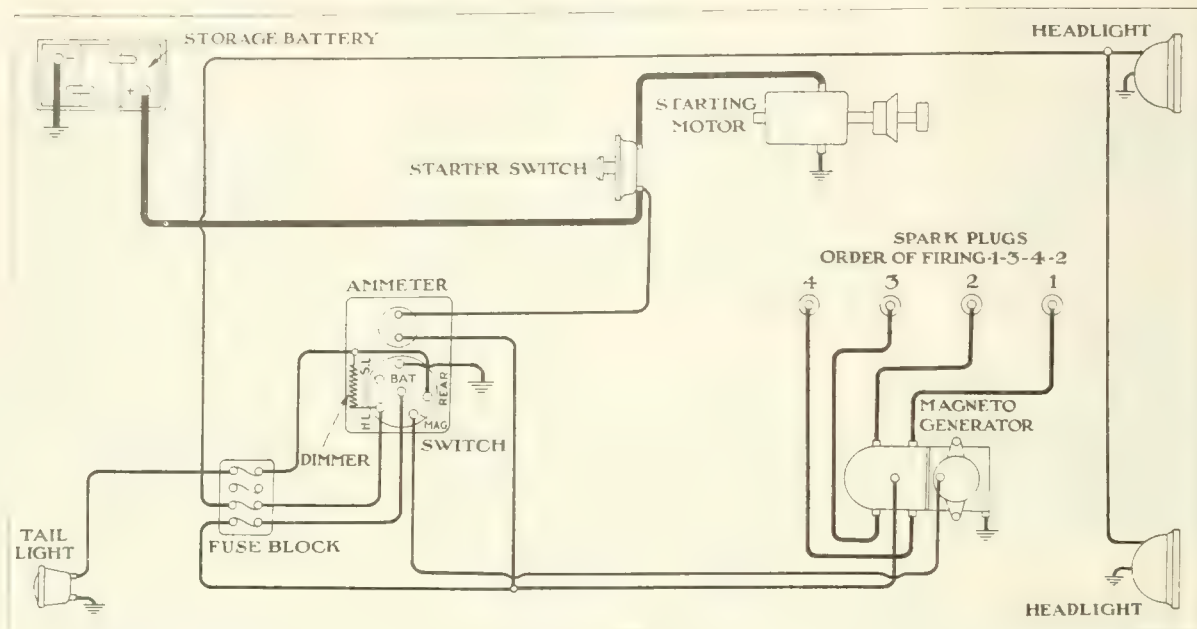
*Duby Wheelgag*



*Knok Tector*

# Motor Truck Electric System Wiring Diagrams

## 22—Starting and Lighting Unit on U. S. Trucks



This shows the starting and lighting wiring diagram used on the U. S. truck with the Eisemann system. When the starter is not included in the equipment, the wire leading from the starter switch to the battery is then run from the ammeter to the battery.

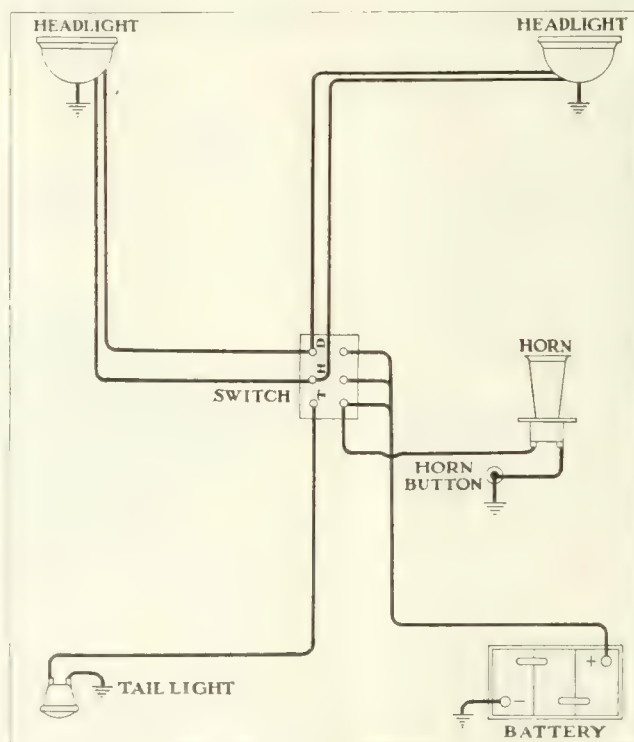
### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE:

1920	
1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting.....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15
1921	
12—Maxwell, Lighting.....	Jan. 15
13—International, Starting and Lighting.....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 15
17—Reo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Apr. 15
19—Stewart, Starting and Lighting.....	May 1
20—Kelly-Springfield, Starting and Lighting.....	May 15
21—Riker, Starting and Lighting.....	May 15
22—U. S. Starting and Lighting.....	June 1
23—Wilcox, Lighting.....	June 1
24—Pierce-Arrow, Starting and Lighting.....	Next Issue
25—Republic, Starting and Lighting.....	Next Issue

## 23—Lighting Unit on Wilcox Trucks



The wiring layout used on the Wilcox truck for lighting purposes only is simple to follow and easily understood. The headlights, it will be noted, are supplied with dimmers as well as with strong lights.





## H. H.'s Engine Problem Solved

To the Editor, COMMERCIAL VEHICLE:

Here are the latest and final developments concerning our truck engine, which knocked and had no power, although everything about the engine was perfect.

As I told you, I secured much more power and relief from knocking by raising the cylinders  $\frac{1}{8}$  in., but the engine was still far from perfect and after a few weeks lost power.

Then we allowed the service station agents to induce us to send the truck to them. Upon its return the operation of the truck was in no way improved. Upon examination I discovered that all they did was to raise the blocks another  $\frac{1}{8}$  in., or a total raise of  $\frac{1}{4}$  in. above the crankcase. This was carrying the matter to an extreme, because, although the engine did not knock, it was very sluggish and had no more power than before.

Finally the factory itself, hearing of this matter, took notice of it and sent to us its direct representative who promised us satisfaction without cost. The truck went back to the service station again.

This time they installed a brand new engine. In addition they put in a new worm and gear with a bigger gear reduction, the original ones being geared too high. The change was approximately from gears of  $8\frac{1}{2}$  to 1, to those of  $10\frac{1}{3}$  to 1.

The truck now has sufficient power. Whether the trouble lay with the engine or rear end, in the first place, I do not know. The increased gear reduction can be instantly noticed when driving, the engine running faster, and the truck traveling slower, than formerly.

This is the final solution of the problem, and I would advise those having similar troubles, to look after the gear ratio, as well as the engine.—HERMAN HARKAVY, New York City.

## Palmer-Moore Owner Wants Information

To the Editor, COMMERCIAL VEHICLE:

Will you kindly inform me about a Palmer-Moore 1-ton truck. The marking on the plate of the engine is as follows: Manufactured by Buda Company, Harvey, Ill.; Model (W) (B/M) 1029 B; Serial No. 21149. There is a number on the engine which is EE176.

Please tell me what the bore of the

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

cylinder is, the horsepower, the number of the engine, the year the truck was made, and the original cost.—N. J. LIGHT, Carmel, N. Y.

The Buda Co. states that the serial number, 21149, refers to a different model of engine supplied to another company. This company believes that the number should be 21449, which is a model W engine shipped on June 28, 1916, to the Palmer-Moore Co.

The size of this model W engine is  $3\frac{3}{4}$  by  $5\frac{1}{2}$ , giving a horsepower rating of 22.5. The original price of this truck, according to our 1916 specifications, was \$1,150.

Other dimensions included in the specifications of your Buda engine include the following in inches: Extreme length of crankshaft, 32; height from center

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

of crankshaft to top of water outlet pipe,  $22\frac{3}{4}$  in.; distance from center of crankshaft to bottom of engine,  $9\frac{1}{4}$ ; distance from center of front supporting bracket to center of rear supporting arm,  $23\frac{1}{2}$ ; drop of supporting arms from center of crankshaft to top of frame, 4 to 6; drop of front support bracket,  $2\frac{1}{2}$  or  $3\frac{1}{2}$ ; length of rear supporting arm, 26; length of engine over cylinders,  $19\frac{1}{2}$ ; length from face of fan to rear of cylinders,  $25\frac{9}{16}$ ; diameter of flywheel,  $15\frac{1}{4}$ ; face of flywheel,  $3\frac{1}{2}$ ; diameter and length of crankshaft beyond flywheel, 1.373 by  $1\frac{1}{2}$  tapped on end  $\frac{7}{8}$  in. with 9 threads; diameter and length of front bearing,  $1\frac{3}{4}$  by  $2\frac{1}{2}$ ; diameter and length of middle bearing, 2 by  $2\frac{1}{4}$ .

In the accompanying illustration is given a power curve of your engine, the data being collected during a test run April 11, 1919.

## Standing Time of Trucks in Actual Use

To the Editor, COMMERCIAL VEHICLE:

On the average, what per cent of the working day of a motor truck is consumed in loading and unloading and other incidental delays?—J. W. SCOTT, Grand Rapids, Mich.

Not only will such a figure be approximate, but it will be of little or no service as applied to an estimate of the performance of a truck in actual service. Neither the capacity of the vehicle in question nor the nature of the service contemplated is stated in the question. Had these points been discovered, the answer could have been much more definite and useful. However, below is a short tabulation of standing time percentages taken from trucks in service, personally observed by staff observers:

Outlet Co., Providence, R. I.,  $1\frac{1}{2}$ -ton Autocar, dry goods delivery, standing time, 35 per cent.

Outlet Co., Providence,  $1\frac{1}{2}$ -ton Autocar, dry goods delivery, standing time,  $15\frac{1}{2}$  per cent.

Borden's Condensed Milk Co., Brooklyn, 10-ton Knox tractor, milk haulage, standing time,  $33\frac{1}{3}$  per cent.

Sheffield Farms-Slawson Decker Co., New York City, 10-ton Hewitt, milk haulage, standing time, 64 per cent.

Howell-Demerest Co., Jersey City, N. J., 4-ton Peerless, milk haulage, standing time, 67 per cent.

Empire State Dairy Co., Brooklyn, N. Y., 10-ton Garford tractor, milk haulage, standing time, 85 per cent.

Sears, Roebuck & Co., Chicago, Ill., 5-ton Pierce-Arrow, parcel post, standing time, 55 per cent.

Sears, Roebuck & Co., Chicago, 3-ton Peerless, parcel post, standing time, 30 per cent.

Particular attention is called to the showing of the two tractors. The first showed  $33\frac{1}{3}$  per cent of standing time, and the latter 85 per cent. To average these gives a figure which is of no value, inasmuch as it represents neither the operating efficiency of either nor the capabilities of either. Both are used in the same service, and should be identically efficient. Yet, though the latter is vastly inferior to the former in efficiency of operation, it actually saves money for its owner over what horse or truck haulage would cost. This figure is utterly useless in determining the permissible standing time of, say, a  $\frac{3}{4}$ -ton delivery vehicle, for such a truck, standing 85 per cent of the time, would be enormously expensive.



## Establishing a Rural Express Route

To the Editor, COMMERCIAL VEHICLE:

What steps are necessary and what advice can you give in regard to the establishment of a rural motor express route? I am contemplating opening up a general motor truck delivery service.

—READER.

The success of a rural motor truck express, such as you propose, depends largely upon the condition of the roads over which the trucks will have to operate and whether they can be negotiated all the year round.

There are many successful rural motor truck express lines in the United States, but a close study of them will indicate that the ones which are profitable are being operated over improved highways.

The success of the work also depends to some extent on the class of goods hauled and to the production of various crops to give haulage all year round instead of for only a few months. The various questions which you must answer for yourself after a study of your particular conditions were perhaps best expressed in the article entitled "How to Establish Rural Express Routes with Trucks to Haul Fresh Food." That article was published in THE COMMERCIAL VEHICLE for May 1, 1918, and the four steps outlined were as follows:

1—Lay out map showing the location of towns from which good products may be collected and the condition of the roads over which rural express motor trucks will have to run.

2—Get together county agents, and highway officials to determine the amount of food products available, to get unimproved stretches of road made passable for trucks and to find the food needs of the city to which the trucks will haul.

3—Then have all producers in the area under consideration fill in a questionnaire to determine the local conditions, the most satisfactory routes and the names of the local farmers best qualified to operate the rural motor truck express routes.

4—Assist the best qualified farmers to start operating trucks over the routes determined upon, making use of the local Return Loads Bureaus to obtain return loads to the rural districts.

## Grease Leaks in Ford Rear Axle

To the Editor, COMMERCIAL VEHICLE:

I have been troubled of late with leakage of grease from a Ford left rear axle housing. What is the most successful method used to prevent this?—S. BARTON, Newark, N. J.

There are several methods used to prevent leakage of this kind. Perhaps before suggesting any remedy it would be well to find the cause for this trouble. We have been told by those who should be in position to know that in the majority of cases this trouble can be attributed to the lubricant working from the transmission through the driveshaft tube and into the differential housing. The result is that there is altogether

too much lubricant in the housing and it is forced along the left rear axle shaft as the latter revolves. One way to stop this but which entails a little work is to disconnect the driveshaft tube at the transmission end.

A felt washer is then placed inside the front universal ball cap back cover, so that it surrounds the projecting end of the universal joint which fits into the transmission.

By thus surrounding the transmission shaft with the felt washers the oil cannot work through from the transmission and consequently will not flow down the driveshaft tube. A large steel washer should be slipped over the universal joint before it is placed back into position on the transmission end.

Ordinarily about 1½ lb. of grease is all that is necessary to put in the differential housing. Of course, if the felt washers at the end of the axle shaft are worn the leaking will become worse. In applying these, two of them should be placed on the axle shaft near the roller bearing next to the differential. A third

## Rural Express Routes

It is always best to make a thorough analysis before entering any business.

The establishment of a rural express route requires a keen study of market conditions, etc.

## Read the Forum Letter on This Subject

washer is placed near the outside end of the axle shaft. If the thrust washers in the differential are worn they allow the axle shaft and differential to shift from side to side and pump out the grease. It usually causes the grease to leak out at the left wheel first as that wheel is near the drive gear.

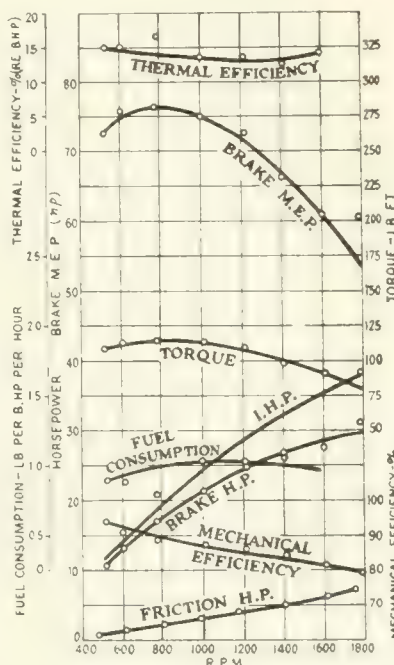


Chart showing Buda engine performance

## Philadelphians Who Fought Bill

To the Editor, COMMERCIAL VEHICLE:

I was particularly interested in the compromise motor truck license fee bill in Pennsylvania secured by the Motor Truck Association of Philadelphia and supported by seven large business organizations in the State. I have heard that a number of Philadelphians were sent to Harrisburg to represent the local truck interests and would appreciate your giving me the names of these men.

—R. FOWLER, Norristown, Pa.

The Philadelphia representatives who appeared before Senator Buckman and members of the State Highway Department, included Walter Y. Anthony, president of the Motor Truck Association of Philadelphia; A. R. Miller and David Ludlam, of the Legislative Committee of that body; Buell G. Miller, of the Pennsylvania Warehousemen's Association, representing motor truck owners; Henderson Supplee, representing the Philadelphia Milk Exchange; W. H. Brearley, an attorney; J. W. Dunaway, of the Curtis Publishing Co.; and E. N. Wright, representing the electric commercial vehicles. There were also represented the Intra-State Automobile Association; the Erie Automobile Dealers' Association and the Pittsburgh Retail Merchants' Association.

## Olympic Truck Made in Tacoma

To the Editor, COMMERCIAL VEHICLE:

I would like to know whether there is a truck named Olympic. If so, where is it manufactured?—A. MEANEY, New York City.

The Olympic truck is manufactured by the Olympic Motor Truck Co., 1856 East 28th Street, Tacoma, Wash. It has a capacity of 2½ tons and sells for \$3,500. Standard units are used in its assembly, including the following: Savage Arms frame; Buda four-cylinder engine; Long radiator; Pierce governor; Brown-Lipe clutch and gear-set, the latter having four speeds; Timken front and rear axles; Liggett springs; and Ross steering gear. The company is not building on a large scale.

## Commercial Ton-Mile and Absolute

To the Editor, COMMERCIAL VEHICLE:

Will you please give me a formula for determining the cost per ton-mile with the following information known:

Total number of miles run, 2140.

Total tons delivered, 517.

Total operating cost per mile, \$0.423.

—H. DORMAN, Providence, R. I.

It is impossible to figure the cost per ton-mile from the figures you have given without knowing the number of trips made in the delivery of the 517 tons of coal and in covering the 2140 miles run.

The reason for this is that the number of ton-miles must be determined for each truck trip and the total number of ton-miles in any given period determined by multiplying the number of ton-miles made on one trip by the total number of trips in the period under consideration. In other words, the trip is the



basis of figuring all ton-mileage. You cannot obtain the total ton-mileage for any truck over any given period by multiplying the number of miles run by the number of tons delivered. The reason for this is that the ton-mile is a unit of work done.

Perhaps you will understand this most readily by permitting us first of all to define the two kinds of ton-miles. The first kind of a ton-mile is the absolute ton-mile which is analogous to the work unit of the foot-pound. The foot-pound is the work done in moving a mass of 1 lb. through a height of 1 ft. Similarly, the absolute ton-mile is the moving of a mass of 1 ton over a distance of 1 mile.

The absolute ton-mile is not used in motor truck cost calculations because it does not take into consideration the empty mileage of the vehicle. For instance, if a vehicle started from some certain point with a load of 10 tons and traveled 5 miles, it would have accomplished  $10 \times 5 = 50$  absolute ton-miles of work. If at the 2-mile point, the vehicle had delivered 1 ton leaving 9 tons of load which had to be delivered 3 miles further on along the route, the absolute ton-mileage would have been  $9 \times 3 = 27$ . If it then returned empty over the 5 miles to the starting point the absolute ton-mileage of this portion of the trip would have been  $5 \times 0 = 0$ . The total mileage of the trip is the sum of the number of work units accomplished on each portion of the trip, or  $50 + 27 + 0 = 77$  absolute ton-miles. This total of 77 ton-miles does not take into account the empty running miles from the point of the last delivery to the starting point of the next load. This empty running mileage is very important because it costs as much, if not more, to run the truck empty than it does loaded.

Then again, the absolute ton-mile is very difficult to obtain, since when loads are dropped off piecemeal, or picked up piecemeal, the calculation of the ton-mileage for the entire trip entails so much work that it is liable to result in the driver taking more time in figuring the ton-mileage than in actually driving the truck.

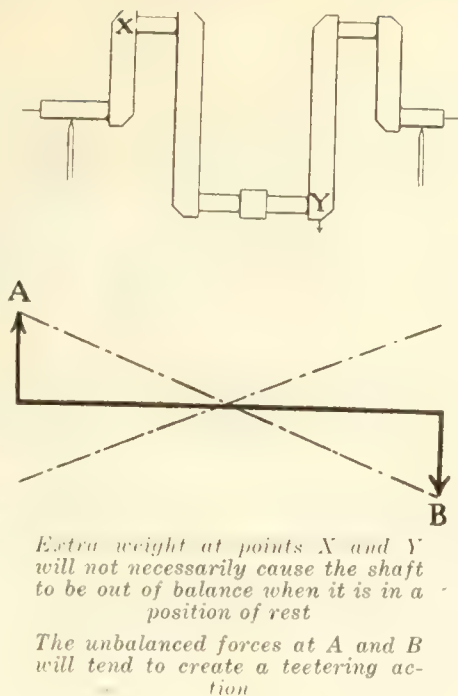
It is for these two reasons that an arbitrary unit called the commercial ton-mile has been adopted for use in figuring motor truck costs. It is this commercial ton-mile which is meant when ton-mileage figures are mentioned in THE COMMERCIAL VEHICLE COST KEEPING SYSTEM. The commercial ton-mile may be defined as obtained by multiplying the total tonnage of any one trip by the total mileage of that trip divided by 2. This requires only one operation and takes into account the empty truck run.

## Static and Dynamic Balance— Explanation of

To the Editor, COMMERCIAL VEHICLE:

I would appreciate an explanation of static and dynamic balance.—J. DUNLAP, New York City.

Static balance is a balance at rest. When we speak of a crankshaft being



in static balance we mean that the shaft will assume a balanced position or one of stable equilibrium while it is at rest. Static balance is obtained by swinging the object on its center and allowing it to assume its natural position of repose. If it is found that the object assumes one certain position invariably then the object is not in balance but if the heavier side is planed off until the object assumes a position of balance in any plane, then it is statically balanced.

## Engine Overhauling

You will save time and money by the suggestions given in the Wisconsin engine repair story. Read it and pass it along to your mechanics.

## Save Time and Money

Dynamic balance is a balance obtained while the object is in motion. Again referring to crankshafts, the shaft will be in dynamic balance when no vibratory forces are set at any rotative speeds. We believe it will be perfectly plain from this that a shaft might be in static balance but not be in dynamic balance, for, let us assume a shaft of a four-cylinder engine such as is shown in the accompanying illustration. The shaft being constructed very heavily of good steel will have very little flexibility and none that could be measured while in a position of rest.

The web at position X might be very much out of balance and this could easily be compensated for by a like weight at position Y on an adjacent web. This shaft could easily be put in static balance notwithstanding the fact that the weights of the webs were not in balance. Now let us assume that the shaft is rotated at a very high speed. The weights at X will tend to fly directly away from the shaft and Y will also

tend to fly out. The result is that we have an unequal balance set up such as is shown in the accompanying illustration. It will readily be seen that these forces A and B will tend to create a "teetering" action, such as is indicated by the dotted lines.

A dynamic balance on a shaft may be obtained by special machines that are made to measure the vibratory forces and the out of balance that is created by these forces. This effect may be pictured by imagining a shaft suspended on a cord and revolved. If there is an out of balance, the shaft will first revolve in a teetering manner, but as soon as its critical speed is reached, the teetering action will be transformed into a revolving action which allows the shaft to assume a new gyratory center. By placing a marker against the various positions of the shaft in this new revolving position the shaft will be marked on its light side. Portions may then be ground off to compensate for this out of balance.

## Determining Battery Sulphation

To the Editor, COMMERCIAL VEHICLE:

What method is there for determining whether or not a battery is sulphated?—R. WOOD, Trenton, N. J.

When a battery is placed on charge and it is found that its specific gravity comes up very slowly it is a sign that the plates are sulphated. The finding of such a condition necessitates that the charging rate be cut down to a very low point and the battery allowed to charge very slowly for a long period of time. In this manner the sulphation is changed back to lead peroxide in the positive plate and sponge lead in the negative plate.

It is well to inquire into the nature of a battery by first determining its age and, if possible, the manner in which the driver has operated the truck. Notice also the charging rate of the generator, then couple these significant facts with the information secured by testing the gravity of the various cells and by finding the discharge under a high current flow. If the battery is rather old and the truck is driven fast and mostly in the daytime, the specific gravity a little low and the voltage under a heavy discharge low, then it is very probable that the plates are sulphated.

## Swiss Railways Seek Protection

NEW YORK CITY, May 26—Dispatches from Switzerland say that the use of motor trucks for transporting goods in that country has become so extensive that the Swiss state railways have requested the government to take legal measures to prevent private firms from competing with them. Not only has passenger traffic on state railways been cut down by the use of private motor vehicles, but freight traffic has also been seriously affected by motor vans. Every time freight rates are raised more persons avoid use of the railways and use the truck service instead.





## Steering Economically!

**Y**OUR drivers carry thousands of dollars of your money in their two hands—that fact cannot be repeated too often—for your trucks are very valuable and somewhat delicate pieces of machinery; they are at the mercy of the type of treatment the drivers choose to give them and the drivers are not under your supervision—nor any supervision—when the trucks are on the road.

Therefore, the importance cannot be exaggerated of choosing the right type of drivers in the first place and training and encouraging them in the right way in the second place.

The tremendous benefits of this branch of truck maintenance are being more and more appreciated in this country. And that they are also being fully appreciated in England is well evidenced by the fact that as important a paper as the *London Times* devotes a column to the subject.

The article in the *Times* emphasizes the fact that if the truck owner is to give a successful service to his customers or get good service himself, the driver must be interested in the welfare of his truck.

Three matters which call for serious attention in connection with truck driving conditions are the following:

- 1—Encouragement to economy.
- 2—Accommodation.
- 3—Lighting and easy engine starting.

These three refer especially to drivers of gasoline trucks, which form the great majority of the total number of industrial road vehicles in Great Britain today.

Every truck owner, whether he owns 60 trucks or two, will be well advised to offer some form of direct encouragement toward economy to those who handle the trucks.

But it is by no means easy to arrive at a sound and just basis on which to form a bonus system. However, it can nearly always be achieved in the end. Fuel, oil, tire saving, freedom from accident, mechanical condition and truck appearance are among the points on which a bonus should be based.

There are great advantages to the policy of running instruction classes in which a man may learn certain methods of driving conducive to efficient and economical vehicle operation.

The first point which should be given attention in such a class is the faculty of being able to detect

certain faults in the running of the trucks by ear, by sight or by touch. If a firm has an inspection day for each vehicle every week, it is quite possible that a defect in the mechanism may develop the day after the inspection. If the driver is able to report the trouble and its locality the small fault may be corrected before it can grow into a big one and much time and money may be saved in this way.

Another item should be full information on the evil results of overspeeding. Many drivers who are otherwise thoroughly trustworthy and conscientious are given to almost habitual overspeeding. Often this is merely the result of the fact that the mischief attendant on driving too fast—quite apart from the increased risk of accident—is not sufficiently realized.

It should be understood by the drivers that the term overspeeding is not intended to mean any definite rate or rates of speed, but the driving of a vehicle faster than the condition prevailing at the time—such as road surface and amount of load carried—would warrant.

Under certain circumstances it may prove far more costly to drive a truck at 10 miles an hour than would be the case at 15 miles an hour under other conditions.

A heavy motor truck cannot be steered like a light car and no one could reasonably expect a driver to wander about the road in his endeavor to avoid holes or patches. But a great deal more can be done toward reducing running costs, if commercial vehicle drivers were persuaded by every means available to the fleet owner to "steer economically."

But the fleet owner should remember that merely instructing drivers to this end is not enough. He must have some definite incentive to keep the importance of economy always before him and to live up to what he has been taught.

The writer in the *London Times* recommends a bonus system to accomplish these ends, and in doing so, comments upon the extent to which the bonus system is used in the United States and what it has accomplished.

If the bonus systems in vogue here have attracted so much attention, is it not possible that a still more extensive use of the bonus may accomplish even greater results among American fleet owners?



## Store Door Delivery to Be Promoted

### Big Reduction in Costs to Be Effected—Plans Already Made by Railroads

WASHINGTON, May 19.—Great interest has been manifested by Government officials as well as merchants and manufacturers in the plan of the Federal highway Council and other organizations to promote the store door delivery system in Baltimore and Washington. A campaign has been undertaken to show the enormous savings possible by increased use of trucks in the distribution of commodities, particularly at this time when the distribution item is an important factor in costs.

Conferences have been held with the Merchants and Manufacturers Assn. at Baltimore, in which representatives of the railroads, National Industrial Traffic League and highway transportation officials participated. At the last Baltimore conference W. I. L. Banham, General Traffic Manager of the Otis Elevator Co., presided. The conference decided that it would appoint a committee to work out details concerning the operation of store door delivery. Railroad agents have indicated that they will cooperate in re-establishing this system, which was abolished in 1913, under an order of the Interstate Commerce Commission, which held that it was discriminatory.

The plan will call for the maintenance of several fleets of motorized vehicles for short haul work. The Federal Highway Council has been directing the campaign for 2 years. The railroads have approved this project because it allows increased use of freight cars through quick unloading at terminals.

S. M. Williams, Chairman of the Federal Highway Council, is quite enthusiastic over the cooperation of the rail carriers, and the interest manifested by merchants and manufacturers in the revival of this plan. In the interview with THE COMMERCIAL VEHICLE, Mr. Williams said:

"The establishment of the store door delivery system in the various cities is, in the judgment of the Transportation Committee of the Federal Highway Council, the first important step toward better transportation. A saving of many millions of dollars will result, because of the great reduction in cost to the shipper; and secondly, relief to the carriers from the necessity of increased terminal facilities and greater efficiency of present equipment by reason of the congestion at terminals, as experienced in the past, and which will be experienced in the future as conditions again become normal.

"In Baltimore the present rate for delivery of Less Car Load by transfer companies is 12½ cents per hundred-weight, with a minimum of 15 cents per package. Our committee has been assured this rate may be reduced to 7½ cents, and possibly lower by proper or-

ganization of store door delivery. This will mean to the shippers of Baltimore more than \$2,000,000. In some cities the saving will be greater, and after all the public pays the bill.

"We do not know of any movement of greater interest to both the wholesaler and retailer than the problems of the Council's Transportation Committee, which were referred to in a recent letter from the General Traffic Manager of one of our large railway systems, in which he was describing the work of the Council's Committee and said: 'The development of a Transportation Committee in which every agency of transportation is represented for the purpose of determining in the public interest the respective spheres in which the different forms of transportation are most efficient, economical and practical, and an effort made to produce mutual understanding and cooperation, rather than to encourage competition.'"

## Texas Bill Hits Trucks

DALLAS, TEX., May 18—Unless the "truck bill" passed at the regular session of the Legislature and effective July 1, is killed or materially amended during the coming special session, the Ship-by-Truck movement in Texas will be as dead as "a door nail," according to motor vehicle men who make a specialty of trucks. That measure, designed by the solons to protect the highways, kills the truck industry and fails to protect the highways, it is stated. The following provisions of the bill, cited by truck dealers and salesmen, show how unprofitable it will be to own and operate a truck in Texas after July 1:

The annual license fee for trucks ranges from \$30 to \$120, according to carrying capacity, starting at 2001 lb. and going up to 10,000 lb.

The annual license fee for trailers, per 100 lb. of vehicle and rated load, is 15 cents for pneumatic tires, 25 cents for solid tires and 35 cents for hard tires. For tractors the license fee is 25, 35 and 50 cents respectively.

No vehicle with a weight exceeding 5000 lb. per wheel or 500 lb. per inch width of tire shall be allowed to operate on the highways.

Owners, operators and drivers of trucks, etc., are made responsible for damages to roads and bridges.

Owners of trucks having a net carrying capacity of 1 ton or more must keep a record of miles traveled, routes taken and counties operated in during the year, and pay a mileage fee of from 1 to 8 cents, according to carrying capacity.

The speed of trucks is limited according to tires and loads. The maximum ranges from 10 to 15 m.p.h.. Every truck must be equipped with mechanical devices to show the limits are not being exceeded.

## Thompson Advances

BOSTON, May 23—Alton R. Thompson has been appointed freight transportation manager of the Packard Motor Car Co. of Philadelphia.

## New Army Bill Orders Truck Sale

### 10,000 Trucks and 2,000 Cars in Lot—Immediate Disposal Obligatory

WASHINGTON, May 26.—An amendment of the Army bill which passed the House this week makes it obligatory on the Secretary of War to sell immediately at public auction or private sale all surplus motor trucks and passenger automobiles now in the possession of the War Department. The provision in the present law authorizing the transfer of motor equipment to the Bureau of Public Roads was eliminated in the Army Appropriation bill.

The surplus is approximately 10,000 trucks and 2000 passenger cars.

Under the terms of the amendment, the Secretary of War has no choice but to sell all the motor vehicles on hand beyond those necessary for an army of 150,000 men. Auction sales of unserviceable automobiles and trucks have been held at camps by the Motor Transport Corps for the past 2 months. There was another last week at South Amboy, N. J.

The introduction of this amendment by Representative Anthony of Kansas precipitated a debate as to the methods employed by the War Department in disposing of surplus motorized equipment. According to Representative MacGregor of New York, sponsor of the drastic requirement of sales, the number of army motor vehicles up to and including April 23, 1921, was 63,429, of which 50,321 were serviceable and 13,108 were unserviceable.

With the proposed reductions in effect, the authorized retention of motor vehicles for the army of 150,000 men would be 4245 passenger vehicles, 19,652 trucks, 4218 trailers, 5058 motorcycles, 2048 ambulances and 1328 vehicles of special designs, making a total of 36,541 motor vehicles for the regular army.

## Victory in California

LOS ANGELES, May 17—The motor vehicle industry of California has emerged from the 1921 session of the State Legislature victorious after having to battle against the most destructive and restrictive legislation ever proposed in this State. On the one side were arrayed the passenger car dealers, the motor vehicle clubs, and the motor truck draymen, and against them were the State's Highway Commission, the motor vehicle department and the county supervisors. After a struggle of four months the concrete result was the passage of an amendment to the existing vehicle act of 1919, which specifies the weight of any four-wheel vehicle must not exceed 30,000 lb. or of any six-wheel vehicle 40,000 lb., and the weight on solid rubber tires must not exceed 700 lb. per inch channel base measurement.



## To Lecture on Truck Servicing

### To Demonstrate Proper Methods of Repair—Principal Cities to Be Visited

DETROIT, May 18—Demonstration lectures to service managers, mechanics and others concerned in the repair and servicing of trucks will be given in various cities beginning May 17 with a lecture at the Cadillac service station here under the auspices of the Detroit Auto Dealers' Assn. The lectures have been arranged through the efforts of Harry G. Moock, manager of the N.A.D.A. and officials of Continental Motors Corp., Timken-Detroit Axle Co., and Borg & Beck. An expert from each of these companies will lecture on proper servicing of those parts and will give demonstrations in repair work.

Experts employed by other manufacturers of standard units will be added as rapidly as is possible and it is hoped to extend the work to cover every large distributing center in the country. In each case the local dealers' association will have charge of arrangements for the lectures, bearing the necessary expense and attending to the work of bringing out a full attendance of those sought to be reached.

Two nights will be devoted to each city and the itinerary of the lecturers following the Detroit meeting will be Cincinnati, May 19 and 20; Indianapolis, May 23-24; St. Louis, May 31-June 1; Kansas City, June 3-4; Omaha, June 6-7; Chicago, June 9-10-11, and Milwaukee, June 13-14. A change in the schedule to include Minneapolis is probable.

There will be no sales or advertising propaganda used in connection with the lectures, the idea being primarily to educate the greatest possible number of those concerned with servicing for the general good of the industry. The companies sending out experts will bear all expense in that connection. The movement is the opening wedge in the free educational movement planned by the N.A.D.A. and which is expected eventually to develop into a motor vehicle chautauqua. Timken will send H. E. Rotert, sales engineer; Continental will have Paul Lund, of the engineering department and C. M. Ahline will demonstrate proper servicing of Borg & Beck clutches. There will be no charge for attendance, the only requirement being the signing of cards so that employers may be made cognizant of the efforts of their employees to add to their knowledge and fitness.

### Washington State Truckmen Must Have Schedules

SEATTLE, WASH., May 24—Motor freight transportation in western Washington is to-day on the same plane of business efficiency as the most highly perfected railroad organized in the country and is declared to be far ahead of

truck freighting anywhere. Radiating from Seattle are truck freight services penetrating in all directions and the terminals planned for this city to take care of the ever-increasing motor services will be among the finest in the country. Announcement has just been made that another new terminal will be constructed at a cost of \$250,000.

On June 10 next a law will become effective under which it will be necessary for motor truck freighters in all parts of the State to recognize their true status as public service vendors and conform to such rules as will protect the interests of the general public at large as well as the investments of the men who have built up the motor freight and business to its present proportions.

Under the terms of the new law, it will be necessary for any person wishing to start a freight line to apply to the Public Service Commission for a certificate of necessity to operate under. They will be compelled to furnish running schedules to be maintained, as well as a copy of their tariff rates. Liability and property damage insurance taken out with an insurance company licensed to do business will be necessary.

### Casualty Rates Increased

HARTFORD, CONN., May 21—Casualty insurance companies here announce a large increase in the rates covering collision insurance. The new rates provide for a 60 per cent increase for full collision, in all territories from one to six; a 40 per cent increase in existing rates for the \$50 deductible cover, in territories one to four inclusive, and an increase of 33 1/3 per cent in the \$100 deductible in territories one to four inclusive.

Some companies will no longer write full coverage, expecting that in this way the losses from collision will be considerably lessened, through the owner's increased sense of responsibility.

### Bus Company Enlarges Fleet

SOUTH BEND, IND., May 25—The South Bend Motor Bus Co. has purchased ten new Nash trucks, and will place them in operation at once, carrying passengers over various routes in the city. Modern bus bodies will be placed on the chassis by the South Bend Spring Wagon and Carriage Co.

### Coming Events

1921

- June 13-16. Detroit, Mich., Annual Convention of National Team and Motor Truck Owners, Inc., held aboard ship during cruise on Steamship Naronic.
- June 15.... Philadelphia, Pa., Annual Outing of the Motor Truck Ass'n of Philadelphia, Lu Lu Country Club.
- June 23-25. Milwaukee, Convention National Association of Commercial Haulers.
- Sept. 28-30. New York City, Electrical Show, 71st Regiment Armory.
- Sept. 2 weeks, Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.

## Californians Desire Better Service

### Draymen's Assn. Requests Makers to Establish Parts Service Stations

LOS ANGELES, May 17.—The Southern California division of the Draymen's Assn. has adopted resolutions requesting manufacturers of complete unit parts to establish parts stations at which genuine parts can be purchased at fair and uniform prices for the units now being manufactured as well as those which are considered obsolete. This method, the resolution asserts, is the only practical way in which motor truck users can get the service to which they are entitled.

The assertion is made that past experience demonstrates that distributors and agents either cannot or will not carry a complete stock of parts. Another difficulty, it is stated, is that manufacturers are constantly changing their representatives as well as their models and that as a consequence members of the association constantly are finding themselves with broken down equipment because no one carries the parts needed.

Another resolution has been sent to the Motor Truck Manufacturers Assn. protesting against opposition to the unit parts station proposal.

### Illinois Railway Protests

SPRINGFIELD, May 21—The Chicago, Rock Island & Pacific Railway Co. has filed a protest with the State Public Utilities Commission objecting to the use of Illinois' hard roads by motor bus companies as an "appropriation of public improvement to private interest." The protest is directed against the Peoria White Star Bus Co. and the Ivy Bus line which the railway complains will force it to curtail its service.

The railway company declares that it already provides sufficient service in operating four trains each day over the same ground the motor bus companies wish to operate.

"The Chicago, Rock Island & Pacific Railway Co., as a large taxpayer," the complaint says, "protests against the use of the improved hard roads of the State, recently built at a great cost, by common carriers for hire by automobile and motor truck, and states the use of said highways by such common carriers amounts to a substantial appropriation of a public improvement by private interests, and for private purposes to the great annoyance and detriment of the public in general."

"The railway company further says the use of said highways by such carriers, who are accustomed to employ large, heavy and cumbersome vehicles, will result in the speedy disrepair, deterioration and destruction of said highways, and without any compensation from the private enterprises so using and abusing them."





THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President      E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. C. Building  
239 West 39th Street, New York

CONTENTS

Vol. XXIV, No. 10      June 15, 1921

LEADING ARTICLES

Are You This Man?	301
A Boon to the Trucking World	304

MISCELLANEOUS ARTICLES

Contented Drivers Cut Costs.....	310
The Truck Plays Many Parts	311
Views in an Ideal Repairshop	312
Something Worth While!	313
Profits with a Sight-Seeing Bus	314

DEPARTMENTS

Your Buda Engine, Its Repair and Inspection.....	306
The Better Way.	316
Buyer's Department:	
New Bodies.....	319
New Diamond T Model Contractor's Special...	320
Yellow Cab Co. Enters Truck Field with Two Models	321
Truck Accessories.....	322
New Shop Equipment.....	324
Motor Truck Electric System Wiring Diagrams....	326
The Fleet Owners' Forum.....	327
Editorial: A Little Warning About Costs.....	330

NEWS

Ace Truck Maker to Sell Direct.....	331
Price Reductions in Truck Field.....	331
Trucks Handle Mine Output Direct.....	332
May Use Trucks Instead of Railroad.....	332

Index to Advertisers      70-71

The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT  
David Becroft, Directing Editor  
Ray W. Sherman, Executive Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879.

BRANCH OFFICES

Chicago, Mallers Building, 59 East Madison Street  
Detroit, 317 Fort Street West, Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law .....	50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



"NORMA"  
PRECISION  
BALL BEARINGS  
(PATENTED)

The "best" car, or truck, or tractor is no better than the "best" or "worst" of the thousand parts that compose it. Failure may often be traced to a seemingly insignificant detail—but it is a failure that, in its results, is equivalent to a failure of the unit as a whole. The standardization of all high-grade ignition apparatus and lighting generators on "NORMA" Precision Ball Bearings is an example of engineering consistency making for high-duty performances.

See that your electrical apparatus is "NORMA" equipped.

THE NORMA COMPANY  
OF AMERICA

Anable Avenue  
Long Island City  
New York



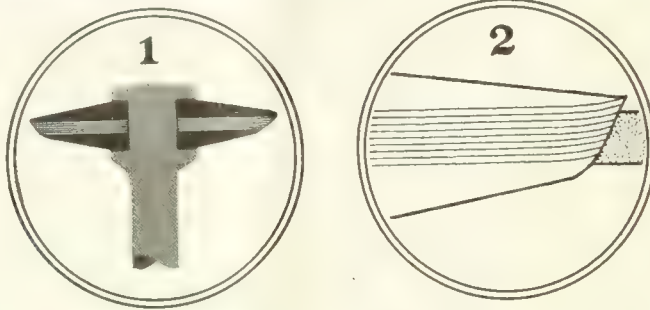
Ball, Roller, Thrust and Combination Bearings

# Flexedge Valves

*Never Need Grinding  
and Always Hold Compression*

## NOTE

This is the first of a series of articles explaining the construction and operation of Flexedge Valves. The next article will be in Commercial Vehicle July 15. Look for it.



## Here's Why

Illustration No. 1 is a cross section of a Flexedge Valve. Note that the head is **laminated** instead of being one solid piece. These laminations are tightly compressed and securely fastened to the stem by a hot forging process.

Illustration No. 2 shows a close-up view of the edge of the valve in the valve seat. As the valve closes and strikes the seat, the edge of the laminated head is flexed slightly. This action removes any carbon that has been deposited and allows the valve to seat properly. A perfect seal is the result and there is no loss of compression—consequently, no loss of power.

As Flexedge Valves never need grinding, they really **earn** money for you. They more than pay for themselves. And in addition they prevent loss of power due to faulty compression.

Write for complete information.

**SELF SEATING VALVE CO.**

340 W. Huron St.

Chicago

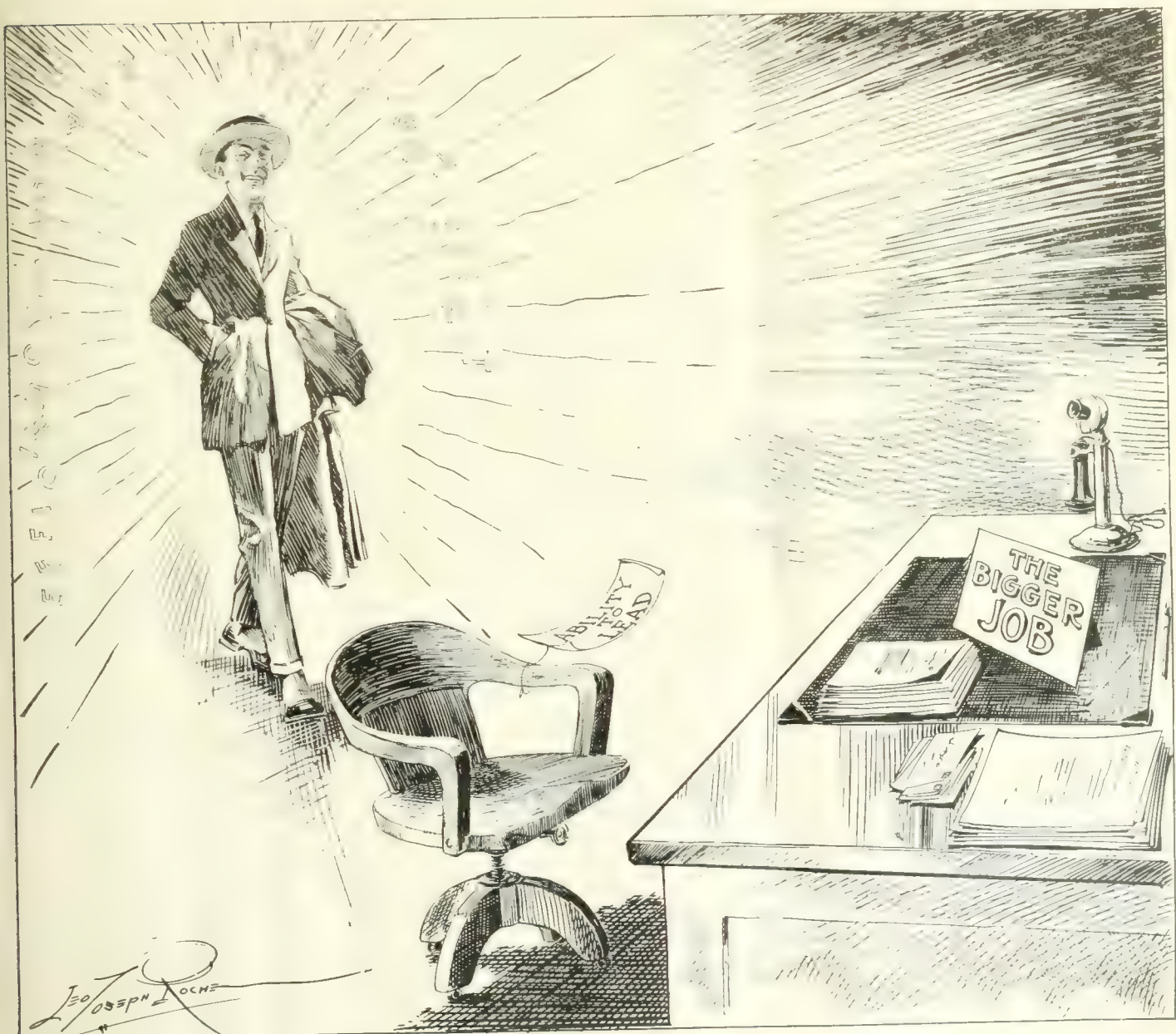


# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXIV June 15, 1921 No. 10

## Are You This Man?



*Perhaps the Next Two Pages May Interest You!*

# Are You The Right Man for the Place?

*Motor Truck Transportation Offers Big Opportunities to Truck Fleet Executives. This Story Tells of Some of the Qualities That Go to Make Such an Executive*

**I**F you are the man in charge of the trucks and in charge of the men who run and maintain the trucks, are you putting the right spirit into your organization? A family takes its tone from the head of a household, a regiment takes its tone from the colonel—and a fleet organization takes its tone from the man with the truck interest—be he foreman, superintendent or manager.

Does the organization under you reflect the right spirit from you?

Truck transportation is looming larger and larger on the business horizon of these United States. And the men who make good in truck transportation are taking bigger and bigger jobs daily and will take still bigger ones.

There is a big field for the man with big ideas—the fleet superintendent who can grow with transportation.

But the fleet superintendent or manager or foreman must not forget—in the midst of his efforts to build up an efficient mechanical and physical fleet operation structure—that there is a mental or psychological side to fleet organization which is just as important to progress and success.

And the mental side is the morale that goes into the superintendent's structure—the morale that his men reflect from him. That is what is meant by the right spirit.

## Fifty-fifty

There can be no doubt that the right kind of spirit of co-operation will smooth the path of daily work. The average human being is a lover of justice. And that means that if he gets a square deal he will give a square deal in return. The difficulty is to let him see far enough into a business to know that he is getting a square deal—even when it doesn't look like it on the surface, perhaps. But once he sees that he is getting it, he is doubly eager to come through with his end of the bargain, just because of the honor and trust shown him in letting him into the heart of things.

The right kind of co-operation is on a fifty-fifty basis. It doesn't mean that an employe co-operates because he has to do so. It means that he co-operates because he wants to, because he has

been co-operated with, *because the boss has put the right spirit into the work in the first place.*

## Friction Means Lost Power

Wherever there is friction there is loss of power. This applies just as much to inter-departmental relations as it does to truck engines,—or any other working unit or collection of units. And wherever a man or a system or a running part causes an excessive amount of friction it should be ruthlessly eliminated.

But the best way to keep friction in a business down to a minimum is to cultivate co-operation not only among the employes themselves but between the employes and the boss. Friction is like an acid that eats into the healthy flesh of a business. And mutual understanding and a spirit of sincere helpfulness and co-operation, *reflected from the boss down*, are an alkali, powerful enough to neutralize any amount of the poison.

The principal object in efficient fleet organization is to reduce costs. And one of the most costly weaknesses of an organization is friction—or the lack of a spirit of co-operation. Therefore, it is along this line that the superintendent can do much to increase his value to his firm and so, eventually to himself.

## Objects to Be Attained

There are five main objects to be attained in the organization of a truck fleet, aside from the modifications and additions required by the peculiarities of the business itself.

The first object, naturally, is supervision. The fleet must be so organized that any and all parts of it are subject to supervision—direct if possible, but at least indirect supervision.

The second object is the encouragement of helpful suggestions from all the employes, for two heads are better than one. An employer or superintendent should try to buy brains as well as labor and a suggestion worth thousands of dollars may originate with the grease-hound.

The third object is cutting out the sore spot. That means locating the man who is making causeless ill-feeling and discontent and eliminating him.

The fourth object is the administra-

tion of justice. The organization should be such as to locate and eliminate real causes of discontent and real injustices.

And the fifth object, which at once stimulates and grows out of the other four, is the encouragement of the spirit of co-operation.

## Message to the Superintendent

There is a message in all this for the superintendent, because it all applies, in many ways, to the organization, necessary to handle a fleet of trucks.

Take, first, the question of supervision. The organization must be so linked together that each man is directly in touch with the work of the men directly under him. That is essential. But it is equally important that the general manager or superintendent be closely in touch with the work of all the men.

There are three reasons for this. In the first place, being the final court of appeal, the manager or superintendent must be able to come to a prompt, intelligent and absolutely just decision in all cases where the decision or even the authority of one of his agents is questioned. And he must be thoroughly in touch with the situation to be able to do this.

In the second place, unless he is in touch with the work of all the men, he cannot keep a supervisory eye on the work of his agents, such as the repair-shop foreman or the shipping clerk.

In the third place, if he is in touch with their work, he can instill into the men the view that their work is of great importance to the entire organization and that he knows it; that he is working with them rather than driving them; and that he knows their work as well as they do, if not better, and that therefore they cannot "slip anything over on him."

## Helpful Suggestions

The second main object to be attained by the superintendent in the organization of his department is the encouragement of helpful suggestions from the men who make up the personnel.

No manager or superintendent need fear that his time will be wasted by fool suggestions from the men under him. Men have too much respect for a boss who treats them right and too much distaste for arousing even the suspicion of



ridicule in his mind, to bother him with half digested ideas.

The danger is all the other way. Unless the manager encourages his men constantly to come and speak their minds to him, when they think there is room for improvement in the organization, he will miss many ideas which might be of great value to him.

In spite of all his efforts, a manager cannot get quite so close to the work as the men who do it—so he cannot see flaws in it that they would see. Therefore, it is to his advantage not only to listen, when they have something to tell him, but even to encourage them to talk about their work.

### Flexible Organization

Moreover, the organization should be as flexible as possible. That is, there should be no red tape and not too many hard and fast rules, incapable of modification.

A curious example of this came to light recently. The garage superintendent of a large and well organized fleet was speaking of his mechanics. In his own words: "Nobody can run things exactly as he knows they ought to be run, even in a company as well organized and as willing to listen as this one.

"I have twelve mechanics here and they're getting about \$40 a week each on an average. But if I had my way, I'd weed them all out and put in three or four master mechanics at \$75 or \$80 a week. I figure that I could save the company \$20,000 a year that way—and the work would be better done, too. These men—for I've watched them—do twice the work that the ordinary mechanic can do and do it in about half the time. Moreover, when they finish a job, it doesn't have to be done over again a few weeks later."

"Why don't you do it?" he was asked.

"Why don't I do it? Because the company simply wouldn't stand for such wages. It wouldn't stop to figure out the saving. It would only look at the principle of paying a mere mechanic \$80 a week. Besides, men of that type are fussy. They must have their lockers and their special tools and the lighting to suit them and so on. But, believe me, they pay in the end. But the company wouldn't stand for their fussiness either."

"Have you tried suggesting it?"

"No. What's the use. I know they wouldn't listen. What's more, if I could get that kind of men under me as mechanics, I could leave the repairs to them and devote all my time to the purchasing end. In that way I could save another few thousand dollars a year."

The company for whom this man is garage superintendent is up-to-date. It believes in encouraging the men to talk. But it hasn't happened to realize that men will not discuss a thing of this sort unless they are actually asked for suggestions, because they think they know already that they will be refused, and they would rather not speak at all than meet with a rebuff. Perhaps, too, the company actually is inflexible on the question of high wages. In this case, it

is missing a chance to save a lot of money yearly.

There are times, however, when neither ordinary supervision nor encouragement to talk will meet the situation.

### Cutting Out the Sore Spot

Every superintendent has probably found himself at some time up against a sore head. That is, he has found that there is someone in the organization somewhere who is spreading discontent in all directions.

Only one thing will fill the bill in a situation of this kind. The manager or the traffic superintendent must be so closely in touch with the men, their thoughts, their personalities and their points of view,—he must have put himself so closely in sympathy with them, without their knowing it—that he can detect the presence of such a trouble maker before he can make any headway. And the same close touch will enable him to locate him.

Once located, such a man should be given a hearing, of course. It may be that he has a real grievance. In this case, the whole thing may be straightened out with a few words and a slight change in the system. But it is also possible that the man is of the type that makes trouble for the love of it. Most employers know the type. And in this case he must be ruthlessly eliminated before he can do any further damage.

But the main point is that unless the manager is in close touch with his men, he will not recognize the small signs that signal approaching trouble until the trouble is upon him and in this case he may have a full sized strike on his hands before he even knows that the men are not entirely contented.

A superintendent of a large garage had an experience of this sort. He found himself suddenly confronted with a full sized strike, although up to that day he had been working in perfect amity with his mechanics.

The strike was limited to the mechanics. And they struck because the drivers—who were also salesmen—were making about \$100 a week in salaries and commissions while the mechanics worked for about \$30-\$40 a week each.

The superintendent scented a sore-head somewhere. He found him and fired him first. Then he fired all the other mechanics, first informing them that he was changing the system to a rate per hour and time and a half for overtime, which is what they struck for.

He also told them that he would take any of them back on that basis, if they wished to come back. They all came back. And they came back on the new basis which actually paid them less, unless they work overtime, than they received before. For they got no pay for holidays nor for time off, as they had before.

Later, by mutual request, the original system was replaced and the men are all happy and contented now. But if he had been able to locate that sore head sooner, the superintendent would have been

saved a lot of trouble and worry.

The manager must also regard the men's work from their own point of view. He must see it through their eyes. And he must be equally ready to look for snags in the organization which makes things unfair to them, as to look for inefficiencies on their part.

For men who have grievances will often refrain from speaking of them, fearing an unsympathetic hearing or even discharge. But these grievances will breed discontent. And discontent will inevitably be reflected in their work.

An interesting case of this sort came to light recently. A wholesaler stored his small fleet in the upper part of a public garage. He hired a corner of the garage for the mechanics and installed a repair bench there, but no machinery. Then he told the men that if they required the use of a lathe or drill press, they could use the one in another building, two or three blocks away.

The garage in which the mechanics were to work was heated sufficiently to keep the radiators of the trucks from freezing, but that was about all. And the mechanics worked there, with fingers so cold that they could hardly pick up their tools. Also, when they wanted the lathe or a drill press, they walked through the streets in zero weather to get to it. And being in a hurry to finish the job, they did not always put on their overcoats for the walk.

They worked in an atmosphere cold enough to send your breath out in clouds of steam, standing over their work with their hands in their pockets and looking hopelessly at an Autocar engine. They were too miserably cold to finish repairing it and they were both suffering from bad colds. Yet they would not complain, because the boss was no mechanic and they were afraid of being fired.

Conditions like the above will not get efficient repairs done.

### How Do You Look to Them?

Lastly, the boss, whether he is the fleet owner himself, the general manager or the superintendent, should try to figure out how he looks to his men. For there is no doubt that the efficiency, cheerfulness, willingness and loyalty of the men of an organization depends to a great extent upon the way they regard the boss.

If, in their eyes, the boss has horns and a tail, the fleet organization may look all right on the surface, but the men won't stand underneath to hold things up when the strain comes.

But let them feel that he knows their work as well as they do, that he is back of them and enthusiastic over their efforts, that he is sympathetic with their troubles and that he believes in their loyalty and willingness to co-operate, and he will find them standing behind him in a solid body when the pinch comes.

It is by bearing these things in mind that the fleet superintendent will grow with truck transportation until he occupies the commanding position which the field holds for him and which he deserves.



# A Boon to the Trucking World!

## Store Door Delivery Is a Great Forward Movement

It Means: —

- 1—Relief from Present Transportation Congestion
- 2—Co-operation Instead of Competition in Transport
- 3—Quicker, Cheaper and More Reliable Deliveries

By W. J. L. Banham

**T**RANSPORTATION is the most important problem in the country to-day and it is only right and proper that buyers of transportation should, at this time, ask the reasons for the present unsettled and unsatisfactory conditions now existing in our various transportation agencies.

The public is entitled to prompt movement of freight. And the carriers, when performing this service, are entitled to just and reasonable rates.

There are three forms of transportation, namely: rail, waterways, and highways. The public is entitled to that form of transportation which is most economical and should not be compelled to use any form of transportation which does not perform the service, both from a time and rate standpoint, to which it is entitled.

We are facing a peculiar condition in the country to-day. On the one hand the rail carriers state that it is necessary for them to secure additional revenue amounting to \$1,000,000,000 a year, in order that their lines may be operated financially successfully. On the other hand, a large number of shippers state that the present freight rates must be materially reduced in order to move the traffic.

### Increases Production Cost

The public, who in the end must pay the bill, feels that the present high transportation charges tend materially to increase the cost of all forms of production. As the result of the high existing rail freight rates, the shippers of the country are diverting an enormous tonnage from the rail carriers to the waterways and highways, with the result that the rail carriers are showing a marked decreased tonnage moving over their lines, and notwithstanding the increase granted them, they are still unable to earn sufficient to meet their operating cost.

The western lines are suffering from keen competition on shipments moving to and from the Pacific Coast by reason of the fact that large freight shipments are now being transported via the Panama Canal, at rates substantially lower

than all-rail rates. The carriers are also required to meet highway competition, which is handling a large amount of tonnage to short haul points, giving more prompt service in many instances at lower rates.

I do not believe our present transportation difficulties can be solved by further increasing the rates now in effect. *What is vitally needed at the present time is the co-ordination of all forms of transportation with view to eliminating unfair competition.*

If it is true that the present rail rates are too high to move the traffic and for



*W. J. L. Banham, general traffic manager of the Otis Elevator Co., who gives in these pages an interesting account of Store Door Delivery and what it means to fleet owners, shippers and transportation generally*

that reason cannot be increased, the rate tendency should be downward instead of upward; it would seem that the only way the transportation problem can be solved, from a financial viewpoint, would be along the lines of reducing the present cost of transportation.

### Use of Terminal Facilities

One of the principal reductions that will have to be made is the present high cost of labor. This reduction alone, however, will not solve the problem. *I believe that the greatest saving the rail carriers can make at this time is by the more intensive use of their equipment*

*and by the more intensive use of their terminal facilities.*

Recent figures show that the average freight car mileage per day is about 25 miles. Some of the principal reasons which explain the present car mileage to-day are that cars are delayed in transit for various reasons, and the carriers are unable to make prompt delivery of cars, due to congestion in their terminals. The shippers are likewise to blame, due to the fact that cars are not unloaded promptly on arrival at delivery point. Delays to less than carload shipments add materially to the carriers' and shippers' expense, due to the fact that there is no definite plan now in effect covering the pick-up and delivering of less than carload freight at our freight terminals.

### Store Door Delivery

With the natural increase of business in the country, steps should be taken at this time tending to eliminate the congestion of freight and delay of cars caused principally by the lack of sufficient terminals to handle freight under present methods.

One of the greatest savings that can be made, in which both the carriers and shippers would secure benefits therefrom, can be brought about by the national adoption of a store door delivery service. Store door delivery, in principle, is sound, and it seems to be the only method by which freight can be moved to and from our terminals in the shortest possible time.

Canada has solved the terminal congestion problem by the adoption of store door delivery. Practically since the inception of railroading in eastern Canada, carriers have provided in principal distributing centers a cartage service to and from their freight terminals and the warehouse or store door of the shipper and consignee. Both services appear to be economically sound, even when viewed from the standpoint of the carriers' interest.

### Success in Canada

•It is interesting to note the reasonable teaming charges in Canada which are made possible by organized teaming under a store door delivery service. The



average cartage rate, to and from the carriers' terminals in Canada, covering a distance of approximately 2½ miles, averages 6 cents per hundred pounds.

While it is generally admitted that store door delivery has proven a success in Canada, the question arises as to whether or not the same system can be used for moving freight to and from terminals in this country. It is my opinion that the principle of store door delivery could be made effective in the movement of freight to and from our terminals. But it would be necessary to make certain changes to cover varying conditions in different parts of the country.

A good transportation slogan for us to adopt would be: "Keep the freight moving and eliminate the cost of the short haul, i.e., terminal expense." The freight that, in my opinion, could be best handled through a store door delivery system would be such freight as requires station or platform service.

### What the Plan Means

A general outline covering store door delivery in our large shipping and receiving centers would be as follows: The carriers when unloading freight in their terminals would be required to segregate freight on their piers for delivery to such zones as might be agreed upon among the shippers, teaming companies and carriers. The teaming companies acting either as agents for the shippers or carriers, would then load all freight for delivery into the shipping zone and delivery would be made direct to the consignee's door or warehouse without delay. By elimination of delays to trucks and by full loading, the cartage charges would be materially reduced.

Similar arrangements could be made to take care of outbound shipments, which could be delivered to the teaming companies under a similar arrangement, covering inbound shipments, delivery to be made as far as possible during the afternoon.

### No Delay at Terminals

The benefits that would accrue to the carrier by the adoption of store door delivery would be as follows: The present free time on freight would be eliminated, as it would not be necessary to hold freight in the terminals other than for segregation and loading on trucks. This arrangement would enable the carriers to handle a greater tonnage through their present terminal facilities and would release their car equipment more promptly. Cars now being held for loading and unloading would then be in the service of the carrier and should produce a revenue, instead of the loss which exists under the present arrangement.

The present cost of handling freight through the terminals warrants the carriers in taking all steps possible toward the prompt removal of freight from their terminals. No storage charge is sufficient to reimburse the carriers for freight held in their terminals on ac-

count of the space occupied, the extra labor through consequent congestion, and the cost of shipments lost or damaged.

### Advantages to the Shipper

Store door delivery has many advantages to the shippers. Under store door delivery freight shipments would be delivered practically on the day of arrival.

With the elimination of trucks from our freight terminals, carrying part loads, and with the further elimination of the delay due to the large number of trucks hauling to and from our terminals, the cartage charges should be

### Fleet Owners, Attention!

Fleet owners and all business men are at present suffering from high freight rates, slow freight deliveries and the high cost of transportation from and to the freight yards.

Store Door Delivery promises to relieve all this. In some instances it has already done so.

But the fleet owners of the country must get behind the movement to install Store Door Delivery and see that it is installed.

Mr. Banham's article gives a clear outline of what Store Door Delivery means and what it can accomplish.

Read it—and then get behind the movement.

Transportation is civilization. And Store Door Delivery is a great forward movement in transportation.

### This Is Your Problem!

accordingly reduced. It is estimated that due to delay of teams at terminals in New York in picking up and delivering freight, the shippers are required to pay approximately \$200,000,000 per year, from which they receive no benefit. If store door delivery makes this saving possible, why is it not adopted? I have not been able to ascertain any good and sufficient reason, except that the carriers have felt at times that if store door delivery went into effect as a carrier's service, it might result at a later date in the carriers being required to absorb the teaming charge as part of the through rate.

In advocating store door delivery, I have made it clear that the shippers and receivers of freight will be required to pay an extra rate for teaming in addition to the usual freight charges. There seem to be no objections on the part of the shippers to this arrangement and for that reason the carriers should not use this as an objection to store door delivery.

### Protection for Carriers

The second objection to store door delivery seems to be the question of liabil-

ity for loss and damage to shipments when moving between the freight terminals and the shippers' warehouses. The carriers could protect themselves from claims of this character, if the teaming was part of the carriers' service, by contracts and agreements with the teaming companies operating to and from their terminals.

If the teaming was performed as a shippers' service, they, likewise, could protect themselves against loss and damage by similar means. These, however, in my opinion, are minor details and can easily be adjusted between the interested parties, once the principles of store door delivery are agreed upon.

Recent press articles show that the shipping public is taking an active interest in the question of Store Door Delivery, and its adoption is being urged in some of our smaller cities in order that the shipping public may be better informed as to its advantages and disadvantages.

As a direct result of recommendations made by the Transportation Committee of the Federal Highway Council, a joint meeting was held in Baltimore between the shippers and carriers with a view to establishing a Store Door Delivery and pick-up service in that city. Both carriers' and shippers' representatives agreed upon the principles of Store Door Delivery and have undertaken to urge its speedy adoption.

### Hopes for Baltimore

It is authoritatively stated that a saving to Baltimore shippers alone of between two and three millions of dollars annually will be brought about. In addition, a great saving to the carriers will be made possible with the adoption of the system in Baltimore and its extension throughout the country, in that the serious present problems of extended terminal facilities to meet the expected increased demands of traffic will be eliminated.

Another big saving, it is suggested, will be made possible in that the rolling stock will not have to be increased to the extent that it otherwise would, due to the rapid unloading of freight cars, once they reach the terminal, and the possibility of putting them immediately into use again. Particularly will this prove true, it is believed, during the periods of the year when heaviest demands are made upon the rolling stock.

### Uses of the Highways

Highway transportation should be given serious consideration, both by the carriers and shippers of the country with a view to relieving the rail carriers of the short haul of less than carload shipments to nearby points. It is generally agreed among the rail carriers, that the hauling of less than carload freight to cities within 40 miles of the shipping points is done at a loss.

This is caused by the high terminal and labor charges which make short

(Continued on page 329)

# Your Buda Engine

## *Its Repair and Adjustment Explained in Full Detail.*

By R. A. Kiken\*

**B**UDA engines are the product of The Buda Co., Harvey, Ill., and they have been manufactured in various models and sizes since 1909. The latest series includes MU "Buddie" 3 $\frac{1}{2}$  x 5 $\frac{1}{2}$ , DTU 3 $\frac{1}{2}$  x 5 $\frac{1}{2}$ , CTU 3 $\frac{3}{4}$  x 5 $\frac{1}{2}$ , FTU 4 x 5 $\frac{1}{2}$ , ETU 4 $\frac{1}{4}$  x 5 $\frac{1}{2}$ , XTU 4 $\frac{1}{4}$  x 6, YTU 4 $\frac{1}{2}$  x 6, ATU 4 $\frac{3}{4}$  x 6 $\frac{1}{2}$ , BTU 5 x 6 $\frac{1}{2}$ , which are all of the removable head type. In each case the two models using the same length of stroke are arranged to be mounted on the same crankcase and the only parts that are not interchangeable are the cylinder block, cylinder head, pistons and piston rings.

### Removing Engine

After draining the engine and disconnecting gasoline line, oil pressure gage line, radiator connections, wiring and clutch, the engine can be readily removed from the vehicle with the aid of a block and chain. A convenient lifting device for affording a hold for the chain hook consists of two forged rings which can be attached to the engine at the two center spark plug openings by pieces of steel threaded on both ends, one threaded end being arranged to suit a drilled hole

through the ring, the same being secured to the ring by a proper size nut. A connection between the two rings to receive the chain hook can then be made with a bar of steel or a piece of timber. The later engines have special tapped holes in the cylinder head to provide for this screw eye device but in cases where such arrangements are not present and the spark plug holes are used, special care should be exercised so that the threaded holes do not become damaged.

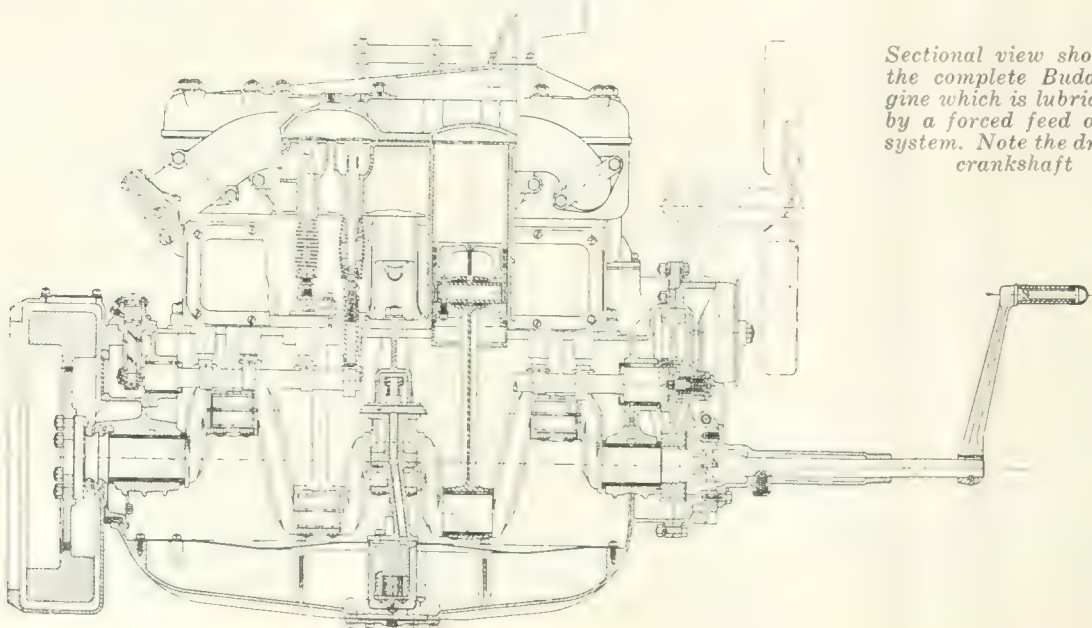
### Disassembling Engine

It is a good plan to arrange before tearing the engine down for a clean work bench and to remove all parts of other units from the bench in order to eliminate the possibility of confusing the smaller parts when reassembling. It is also advisable while the engine is still suspended by the chain hoist to wash its exterior thoroughly with gasoline as a clean surface promotes better and more careful workmanship. The engine can then be placed on the stand in an upright position. The first step should be the removal of the cylinder head for the reason that this will permit an inspection of the cylinder bores and in case it is found necessary to regrind the cylinder and fit the same with new pistons and rings on account of being scored, this can be taken care of while work is progressing on the rest of the engine.

Buda engines are arranged to permit the ready removal of the cylinder head without damage to the gasket. There are lugs cast on the front and rear ends of both the cylinder head and cylinder block, the same being arranged with drilled and tapped holes in the head lugs while there is merely a finished surface on the lugs on the block. It is only necessary with this arrangement to install capscrews in the cylinder head lugs after having removed the cylinder head stud nuts, then screw down capscrews against cylinder block which forces the head away from the block. The next step is the removal of the gear case cover and oil pan in order to permit of an inspection of the interior of the engine.

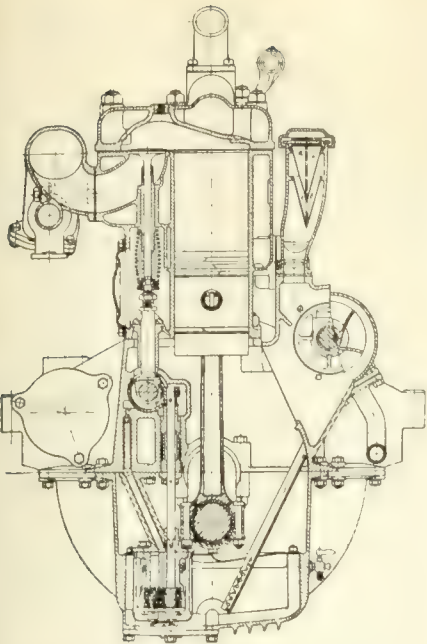
The connecting rod assemblies and pistons can then be taken out without removing the crank shaft. In doing this one should bear in mind the location of each assembly in relation to the number or bore of the cylinder. Buda connecting rods are stamped with the number of the bore on the crankshaft end of the rod and these numbers appear on the side opposite from the camshaft. However, in case the connecting rods have previously been changed in the field these numbers will probably not then appear. Therefore, it would be a good plan before removing the rods to see that a number is stamped on them to identify their location. Also it is well after having detached the connecting

\*Service manager of the Buda Co., Harvey, Ill.



*Sectional view showing the complete Buda engine which is lubricated by a forced feed oiling system. Note the drilled crankshaft*





Front section view of Buda engine

rod cap so as to release the rod from the crank shaft, to immediately reapply the cap to the rod with shims, bolts and nuts intact so as to eliminate the possibility of a loss of any of these parts and it is especially important that the shims be not displaced. The piston rings should then be removed from the pistons and these should be kept together with respect to their original location.

A good method to use in taking the rings off of the pistons in order to prevent breakage, is to apply three pieces of light gage sheet metal under the piston rings spaced equally around the piston. These pieces of metal or skids as they might be termed to describe their function, can be put under the rings by starting at the slot and then pushing them around to the point desired. The rings then being free of the grooves can be pushed up over the head of the piston. This same arrangement works equally as well in applying rings to the piston.

The carbon should be thoroughly cleaned from the piston head and ring grooves.

feeler gages should be available for checking purposes one being .003 thick and the other .004 thick. The piston should fit loose on the .003 gage and tight on the .004 gage, thereby indicating a proper clearance of approximately  $3\frac{1}{2}$  thousandths. This inspection should be followed from the base of the block through to the top as it is usual that more wear will appear near the top, the same being caused by the heavy operating strain at this point as well as accumulated carbon in the upper piston ring grooves wearing on the walls.

Regrinding Cylinders

If the cylinder bores have become worn to such an extent that they indicate a taper of greater than .003 or are found out of round to the extent of a dimension beyond this same figure we would recommend that the block be reground and fitted with new pistons and rings. It is to be pointed out that frequently recommendations of regrinding are made without any actual inspection having been made and it is not a good plan to go to this expense unless it has

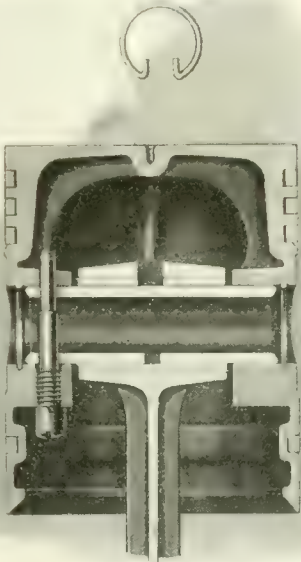
been found by inspection to be absolutely necessary. It is suggested if the block is reground that the same be finished with a dimension of either .010, .020 or .030 oversize as pistons and rings can be readily secured for these sizes. All bores should be ground to the same size diameter in order to permit of even compression. It might be mentioned that grinding is recommended instead of boring or reaming since in this way a hard, burnished surface is produced, the same being round, smooth, straight and square with the base of the cylinder block. Boring or reaming usually produces a surface that is soft and porous and therefore the bores are subject to unnatural and rapid wear. Regrinding of cylinder blocks should be performed by a mechanic experienced in this particular line.

Fitting Pistons to Cylinders

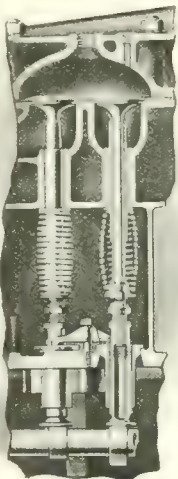
After grinding the barrels new oversize pistons and rings should be secured to correspond to the new size of the block, taking into consideration the clearance to be allowed. When fitting the pistons to the block the same arrangement for checking the piston fit can be used as described previously in connection with the inspection of the cylinder bores.

Fitting Piston Rings

In addition to fitting the pistons to the bores the new rings should be fitted also. It is well when doing this to place the pistons in the bores near the top of the block, considering that the work is being done from the bottom or crankcase end of the block. The rings then when inserted in the block for fitting purposes will rest against the bottom of the piston, thus eliminating the possibility of the same being in a cocked position when checking the gaps. The total opening or gap in the ring should amount to .001 of an inch per inch of cylinder bore and this can be checked with a feeler gauge of the proper thickness. This allowance is based on the standard Buda diagonally cut turned ring. The rings should now be fitted to the piston grooves. A side play of .002 should be allowed at this point and this can be checked by first rolling the ring in the groove around the outside of the piston. If the ring



Cross section of piston, showing spring retainer ring which expands in grooves in end of piston bosses



Valve mechanism, showing split type of wedge grip valve spring retainer lock



Inspecting Cylinder Bores

A compression leak has considerable influence on the power of the engine; hence, a most important item of inspection is to determine as to whether the cylinder bores and pistons are worn to such an extent as will permit the charge passing the pistons. A micrometer measurement in checking this condition is the better method, but satisfactory results can also be obtained with the aid of a piece of feeler steel of sufficient length to reach from the base to the cylinder through the bore to the top of the block. The thickness of the gage to be used is dependent on the bore of the cylinder and a good working basis is to allow .001 clearance between the piston and the cylinder bore for each inch of piston diameter. Considering, for example, a  $3\frac{1}{2}$ -in. bore cylinder, two sizes of



is too wide the same can be narrowed by rubbing the ring back and forth on a piece of emery cloth. The cloth should be held down flat and an even pressure should be exerted on the ring so that the side surface will run true. This dimension can then be definitely checked by putting the ring in the groove for which it is intended and placing a proper size feeler at the point to be checked.

### Assembling Piston Pins

The assembling of the piston pin is an important operation and too much care cannot be exercised in this operation. If new piston pins are used the same should first be fitted to the connecting rod bushing and there should be a good bearing at this point.

A good method to use in determining as to whether a pin is fitted too tight or too loose is to install the pin in the connecting rod for which it is intended, then clamp the piston pin lightly in a vise with the connecting rod extended into the air. The tension of the bushing against the pin should permit the rod to lower itself slowly. If the rod falls quickly the pin is too loose, if it does not lower itself by its own weight the pin is fitted too tight.

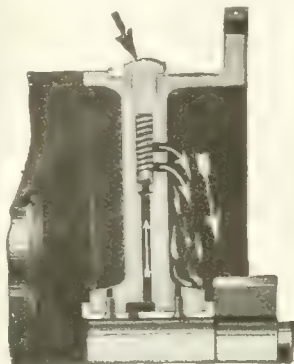
A piston pin that is fitted too tight freezes to the connecting rod bushing and results in a scored cylinder while a piston pin loosely fitted causes a knock. The piston pin should be a driving fit in the piston but the same should not be forced in such a manner as would knock the piston out of round. Buda engines have a double locking device for retaining the piston pins consisting of double diameter nickel steel set screws, which are of sufficient length to pass through the upper set screw boss and through the piston pin to the lower set screw boss, as well as retaining rings which are placed in grooves provided for the purpose at each end of the piston pin. It is the customary practice to place the set screw side of the piston toward the timing gear end of the engine.

### Crankshaft and Bearings

When removing the main bearing caps careful attention should be given to the shims as these parts must not be interchanged if the old bearings are to be used. To identify the location of the bearing cap it is well to punch mark both the crankcase and the cap. It would be better not to remove the flywheel from the crankshaft unless new bearings are to be put in as the flywheel bolts are a driving fit in the flywheel and crankshaft flange and their removal would not permit such a snug fit when reassembling. However, this is not a point to be feared but it is desired to impress the importance of careful work at this point. If any of the bearings require replacing which should not be necessary unless a lack of oil has brought the condition about, special care should be taken in seeing that the oil holes in the bearings line up with the oil lead hole in the crankcase as in case this opening is closed off to any extent and only a small

amount of oil gets through it is quite likely the connecting rod bearings will starve for lack of oil as in the force feed lubrication system the lubricant is forced from the main bearings to the connecting rod bearings. Further details on the lubrication system will be covered later.

Most good mechanics are familiar with the operation of scraping in new bearings but it is desired to point out a common error in connection with this detail. It appears to be the practice in the field to disregard the fact that bearings in an engine equipped with the force feed lubrication system should be relieved in a different manner from those installed in an engine equipped with a splash lubrication system. As has been mentioned,



*Oil pressure is regulated by this check valve. Regulation is simply made by the addition or removal of washers to increase or decrease the pressure of the spring which holds the ball on its seat*

the oil is forced under pressure from the main bearings through the drilled crankshaft to the connecting rod bearings; hence it is necessary that no outlet must be present to permit the flow of the oil away from the main bearing before it can reach the opening in the crankshaft. It is of course necessary to relieve the bearing to allow a drag over of the babbitt metal but this relief must not extend the full length of the bearing and there should be at least  $\frac{3}{8}$ -in. of metal at each end of the bearing so as to form a seal and eliminate a possible groove that would permit the oil to run out of the bearing at this point. This  $\frac{3}{8}$ -in. of babbitt should fit tight up to the shims which are equipped with babbitt tips anchored to the shims in such a position as will permit lining up with this metal left in the bearing relief to form the seal and it is extremely important that these tips are not removed. This arrangement also applies to connecting rod bearings. The center main bearing takes up all the end thrust on the crankshaft and there should be allowed from .006 to .008 of an inch clearance between the center bearing flange and the crankshaft. It is important that a clearance of .025 be allowed at each end of the rear main bearing and the same amount at the rear end of the front main bearing. In addition a clearance of at least .006 should be present between the front end of the front crankshaft bearing and the crankshaft gear. These clearances are provided to take care of the expan-

sion in the crankshaft. Connecting rod bearings should be allowed .003 of an inch for endplay.

### Lubrication System

The geared oil pump located at the center of the engine is suspended by a bracket bolted to the crankcase. The same is entirely surrounded by a screen which prevents foreign matter from entering the pump and getting into the oiling system. The pump is driven from the camshaft which has a spiral gear cut in at the center bearing and the driving connection is formed by a gear and vertical shaft which drives the pump through a coupling attached to the driving gear in the pump. The oil pump assembly can be inspected by merely removing the cover which is fastened to the body by four cap screws. It is a good plan to make this inspection while the engine is down and the important detail is to see that the gears are in good condition.

Special attention should be given to the matter of gaskets when reassembling the pump and it is very important that the gasket between the body and cover be of the proper thickness. If it is necessary to change the gasket see to it that the new gasket used is of the same thickness as the one removed. The best safeguard is to use genuine Buda gaskets. Further, the gaskets between the pump and bracket as well as between the bracket and crankcase should receive the same measure of attention as a leak at either of these places will cut down the oil pressure and it can be readily seen that if the oil lead hole through the bracket is covered by the gasket no oil will circulate through the engine.

The oil is pumped through a tube in the bracket to the horizontal tube which extends the full length of the crankcase and then through drilled oil leads to each of the main bearings, camshaft bearings and connecting rod bearings. The front oil lead carries the oil to the crankshaft front bearing, the front camshaft bearing through the drilled crankshaft to the No. 1 connecting rod bearing. The rear oil lead provides lubrication for the crankshaft rear bearing, rear cam bearing and to the No. 4 connecting rod bearing by being forced through the drilled crankshaft while the center oil lead carries the oil to the crankshaft center bearing, camshaft center bearing and the numbers 2 and 3 connecting rod bearings.

The cylinder walls, pistons and piston pins receive their lubrication from the oil thrown from the connecting rods. The valves and push rods are taken care of by the oil fog or vapor that passes through the openings provided for this purpose inside of the valve enclosure. The timing gears are supplied with oil from openings in the passage leading from the front crankshaft bearing to the oil pressure regulating valve as shown in illustration on this page.

The oil pressure is regulated by a check valve located in the crankcase back of the timing gear case cover. An operating pressure of 15 lb. is recommended at an engine speed of 1000 r.p.m. and



an adjustment to this pressure can be effected by either removing or adding washers under the regulating valve screw. The removal of washers has the effect of allowing the screw to go down further; hence increasing the tension on the spring, thus increasing the oil pressure. The addition of washers has the opposite effect, thus reducing the pressure.

### Water Pump Assembly

It will be noted from the illustration that the water pump assembly, including the driving gear, driveshaft, housing and the pump proper can be removed as a complete unit and from the outside of the engine. The water pump is fitted with a large bronze runner mounted on a shaft covered by a bronze sleeve. The runner is held in place with a key and taper pin, and it is not necessary to disassemble the pump and inspect this detail unless the engine has shown signs of overheating considerably, then the runner should be inspected to see that the same has not become loose from the shaft, hence failing to rotate.

### Oil Pan Bell Housing

Buda engines are made with the oil pan cast separately from the bell housing in order to permit the removal of the pan when the engine is in the vehicle without disturbing the unit connected back of the engine. When reassembling the pan to the engine, a good gasket should be used and if the old gasket is damaged it would be well to install a new one. It is important that the gasket fit well, and the standard Buda graphited gasket gives the best results.

### Gearcase Cover

A gasket should be placed between the gearcase cover and the crankcase in order to prevent oil leakage, and the gearcase cover should be drawn up tightly to the crankcase flange. The gearcase cover is arranged to assist in the adjustment of one other part, and that is the camshaft. The camshaft end-thrust is taken up at the gearcase cover with the aid of a thrust screw assembly, including a thrust spring, thrust spring plunger and thrust spring nut. It is important that this thrust plunger bears against the steel ball in the end of the camshaft, otherwise endplay of the camshaft will result, causing a knock at this point.

If it is necessary to remove the timing gears take care to have them marked so that they can be reassembled in the same position in relation to the teeth, as in case the relation of the teeth is changed when reinstalling the gears the timing will be affected.

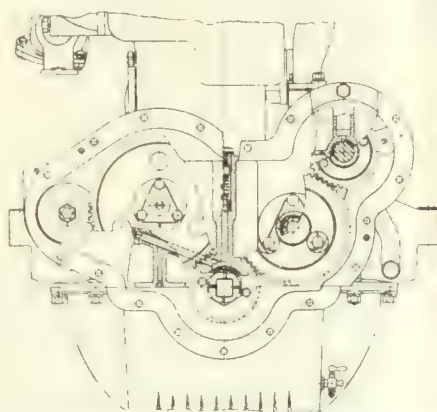
### Valve and Valve Mechanism

As will be noted from the illustration, the lower end of the valve spring and valve spring cup is held fast by a split-type, wedge grip valve spring retainer lock. The valve can be released by raising the valve spring and removing the retainer lock. The carbon should be thoroughly removed from the valves before any attempt is made to reinstall

them. If the valves have been seating properly no effort should be made to re-grind them in the seats as this only has the effect of removing the glaze from the old seat and starting a new seat. However, if the valves have become burned, which would probably come about through insufficient tappet clearances, a thorough inspection of the parts should be made, and if the same are warped or badly burned, new valves should be installed. It will, of course, then be necessary to grind in the new valves in the regular manner.

### Push Rods or Tappets

Push rods, sometimes called valve lifters, since valve lifting is the function that they perform, are the means of lifting the intake and exhaust valves at the proper time to permit the new gas to enter and the burned gas to be discharged



*End view of a Buda engine showing timing gears*

from the cylinder. Push rods seldom need replacement, but as the guide in which the push rod rides is easily removed from the outside of the engine, it takes only a few minutes to make this change, if necessary. An adjusting screw is used in connecting with the push rod, and the valve stem rides on the tool steel block insert in the adjusting screw. The purpose of this screw is to provide adjustment, which is necessary on account of the fact that a valve does not become thoroughly seated from the grinding operation but it continues after the engine is in service to work down till a hard glazed surface is formed. In addition, there is the wear on the end of the valve stem which condition demands an adjustment if the valves are not to ride open. A clearance of 0.008 on intake valves and 0.012 on exhaust valves should be provided in connection with all sizes of engines up to and including 4¼-in. bore. Engines having a bore larger than this, and up to 5 in., should be provided with clearances of 0.012 on intake valves and 0.016 on exhaust valves. These clearances should be set when the engine is warm. If lesser clearances are used, the expansion that takes place in the valves on account of the heat formed above the valves will cause the valves to ride open, since they cannot seat properly if something interferes with the stem going all the way down. Valves that ride open

produce very detrimental conditions, including lack of power and consequent damage to the valves and valve seats. Tappet clearances should be checked and reset regularly.

### Cylinder Head

The carbon should be thoroughly removed from the cylinder head and care should be taken in reinstalling the gasket and head. It is necessary that there be a perfectly tight joint between the head and the cylinder, and this is controlled by the gasket and the manner in which the cylinder stud nuts are drawn down. When tightening cylinder stud nuts one should tighten the center nuts first then the outside rows by working from one side to the other as progress is made toward the opposite end of the cylinder head.

### Ignition

Where magneto or battery ignition with manual control of timing is used, the spark should be set to occur on top dead center with the spark control lever at full retard. Where fixed spark setting is used with either magneto or battery ignition, spark should occur about 2 inches ahead of dead center, measured on the flywheel from the dead center marking on same, or in degrees of angle approximately 10 degrees advance. All flywheels are marked to indicate when the pistons are at dead center, also when the valves open and close. With ignition wires to the No. 1 spark plug connected and plug laying on top of the cylinder, it will be noted that a spark occurs readily as the crankshaft is revolved. This is an indication of whether the ignition system is functioning or not. On setting flywheel to No. 1 dead center, the breaker contacts should be just about to open at this point. In case of fixed spark the flywheel can be marked with chalk or pencil 2 inches in advance of the dead center marking, as noted, and the breaker box so set that its contacts will be about to open at this point.

In adjusting and overhauling an engine, it is very important to see that the breaker contacts in magneto or distributor are adjusted to the gap required by the manufacturer. This applies to spark plugs also, as a little variation in the gap of a spark plug will sometimes affect the performance of an engine considerably. Ignition wires should be examined to see that they are free from oil and are in good condition, as well as the insulation around supporting cables or tubes.

If the spark plug gap is too great the spark will not jump when the engine is under compression; if too close, the engine will not throttle nor pick up and the plugs are more likely to foul. The gap should be not less than 1/64 of an inch and not more than 1/32 of an inch, 28/1000 would be the ideal distance.

Spark plugs of sufficient length to reach through the port plugs should be used, as when very short spark plugs are used the points are located in a pocket and the engine will be hard to start and may fire irregularly even when warm.

# Contented Drivers Cut Costs

The Ludwig Baumann Drivers Are Contented  
Because They Are Handled Right and Know It

"DRIVERS are very much like other employees. They will respond to a certain amount of the right kind of supervision. And they will respond to a certain amount of the right kind of logical consultation and instruction.

"The only difference is that drivers, through the nature of their work, are less susceptible to supervision. Therefore, the consultation and instruction must be done more carefully, more logically and more thoroughly, to take the place of the missing supervision."

This is the point of view of F. A. Reif, general manager of the Ludwig Baumann furniture and department store, New York City.

Mr. Reif's logical consultation and instruction is simply a matter of stating facts to the drivers in a way which will come home to them without antagonizing them.

"My point of view is that we are all one happy family. And like a happy family, we are all working together and



The silvered brass cap-badge presented by the company to the Ludwig Baumann drivers, which characterizes the spirit of the organization

to the same end.

"You, see, I believe in letting my drivers into my confidence. The fact is that all our positions, theirs as well as mine, depend upon the success of the business.

If the business is a success we all gain by it. If the business is a failure or goes backward instead of forward, we all lose by it, sooner or later.

"So I talk to my drivers along these logical lines. I tell them that it is like this: If ten men can do eight men's work and no more, those men will ultimately find themselves splitting the salary of eight men between them, for things always work out like that in the end.

"But, taking a man's work as the average amount accomplished in an 8-hour day, if eight men, on the other hand, can do the work of ten men, they will ultimately find themselves splitting the salaries of those ten men between them, for things usually work out that way also, and if they don't work out that way by themselves, I will make it a point to see that those eight men actually get the salaries of ten men between them.

"Thus these men will ultimately benefit by their ability to benefit the business.

"But these things are neither threats nor promises. For I do not believe in either. Nor will I listen to either from my men. Threats are useless always, from either side. And performance counts for more than promises on both sides.

"We have three methods of keeping track of the drivers' time. One of these is an entry of the time a driver calls on

a customer and also of the time when the driver leaves that customer.

"At first my drivers resented this system. So I called them together and talked it over with them.

"I told them that I had no desire to prove that they were cheating the company on time. My desire was to prove, by means of this system, that they were not doing just that thing.

"I told them that any man who was honest would welcome such a plan, for it would conclusively prove their honesty to the man higher up.

"Any man who is not honest, we do not want with us!"

After this talk the Ludwig Baumann drivers changed their attitude entirely toward the system and it is working excellently.

Altogether, Mr. Reif's system of handling the men is a good one, for they are contented and willing, which cuts costs—and they follow out the report systems with a care which greatly simplifies supervision.

## DRIVER'S REPORT

Date \_\_\_\_\_ Car No. 131  
Driver \_\_\_\_\_  
Helper \_\_\_\_\_  
Left Garage \_\_\_\_\_ Hubodometer Reading \_\_\_\_\_  
Returned \_\_\_\_\_ Hubodometer Reading \_\_\_\_\_  
Total Mileage \_\_\_\_\_

### SUPPLIES

Gas \_\_\_\_\_  
Oil \_\_\_\_\_  
Tires \_\_\_\_\_  
Gasoline \_\_\_\_\_  
Oil \_\_\_\_\_  
Petrol \_\_\_\_\_  
Chassis \_\_\_\_\_

NUMBER OF TRIPS \_\_\_\_\_

Minimum mileage for this day is \_\_\_\_\_ the minimum following day is \_\_\_\_\_

The Ludwig Baumann driver's card contains all the necessary data and no more

## DRIVER'S REPORT

TROUBLES REPORTED BELOW  
MECHANIC WILL CORRECT ALL

MOTOR	MISC.
Ignition	Wheels
Carburetor	Springs
Cooling	Frame
Lubrication	Radius Rods
Valves	Radiator
Power	Fan
Knock	Fan Belt
Compression	Pedals
Missing	Levers
TRANSMISSION	Wind Shield
Clutch	Hubodometer
Gear Box	Fender
Universal	Cab
Jack Shaft	Front Fastenings
Differential	Front Pins
Chains	Rear Hooks
BRAKES	Rails
Foot Brakes	TIRES
Hand Brakes	Left Front
STEERING GEAR	Right Front
Gears	Left Rear
Tie Rods	Right Rear
Front Axle	LAMPS
	Tail
	R. Front
	L.
	Search Light

Driver Will Check & Opposite Item Requiring Attention

Repairs and Adjustments made

O. K.

Mechanic

The reverse of the driver's card, showing the check-up for necessary repairs



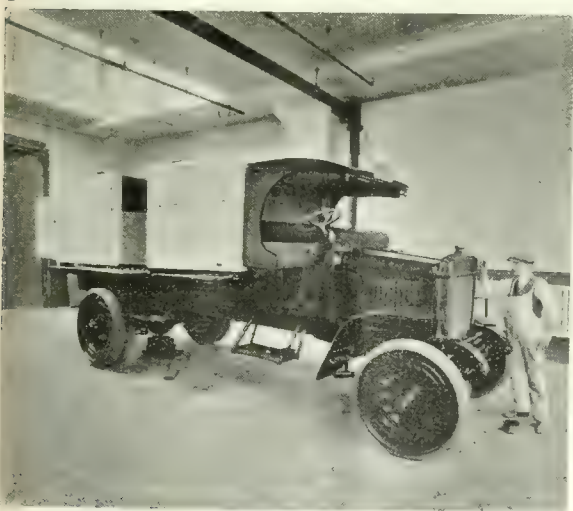
# The Truck Plays Many Parts



**Above**—Truck furnishing a city's water supply. During a recent electrical storm, the motors used at the pumping station in Clintonville, Wis., were burned out. In the emergency, the FWD fire truck shown here stepped into the breach and pumped the water for the city's supply into the tower, shown in the distance. The tower is 164 ft. above the pumping station and about a mile away. The truck, equipped with a 500-gallon pumper, was located near the city's well and the intake nozzle lowered into the water. The water was pumped through two lines of hose which were connected with the pipe lines inside the pumping station



**Left**—Fleet of Commerce passenger buses used by the Sangamon County Mining Co., near Springfield, Ill., to haul the company's employees to the mines



**Left**—View of the Wheat Ice Cream Co.'s paint shop. Note the excellent lighting, which comes from a big skylight in the roof. Also the room is entirely shut off from the rest of the garage to prevent dust from falling on the wet paint. **Right**—What an ideal private garage looks like. Note the wide spaces between pillars, the heating and lighting appliances and the drainage. The floor has just been washed down



# Views in an Ideal Repairshop



Top—Corner of the repairshop for gasoline trucks in the Marshall Field garage. When a truck is overhauled in this repairshop, the overhaul is a thorough one, as the chassis in the foreground shows. Bottom—Some of the machine tool equipment with which the mechanics are supplied at the Marshall Field garage in Chicago. Note that this part of the shop is even cleaner than the rest, a safeguard against accidents. Inset—Device for testing engines after overhaul. Note the big gasoline tank and the batteries on the stand.



# Something Worth While!

By Sinclair Gluck



**B**ARRON, assistant superintendent of the big commercial house garage, came into the president's office with a rather furtive look in his eye.

Old Silas Gunther—Old Hammerhead, as his men called him—had not made himself president of the big company without learning a lot about men. And he recognized the look for sheer nervousness, rather than a subtle evidence of general depravity.

For the young assistant superintendent was a comparatively new man who had been taken on because of the enlargement of the truck fleet—and up to this time he had not shared the experience of most of the other employees, in finding himself face to face with the boss for a talk.

As this was the first talk Old Hammerhead let the new man have the full benefit of the genial smile that had played no small part in placing its owner in the president's chair.

"Well, Barron," he said, "I hear you are doing nicely in your new job and I thought it was about time we got acquainted. I like to know all the men who work for me. For sometimes I can help you a little and almost always you can help me!"

Barron looked a little flustered at this and smiled feebly. Then his face settled back into the worried little frown that was its natural expression.

Old Hammerhead leaned back in his chair. "Sit down, Barron, and tell me how you like the work."

The young fellow subsided into a chair. "Why—I—I like it all right, sir," he got out.

Old Hammerhead laughed. "You don't sound very enthusiastic!" he said. "Anything wrong about it? Anything troubling you?"

"No, sir, I don't think so. I like working here and Mr. Ross is an easy man to work with."

Old Hammerhead nodded. "Well, I wondered about that," he said, "because, to tell you the truth, it has seemed to me that you look kind of worried now and then—and a man who is worried is usually up against something that he can't get a grip on. It's like the weather,

when you're going into the country.

"You can't get a grip on it and make it do what you want it to, so you worry about what it is going to do." The old man paused and smiled pleasantly. "What's worrying you, my friend?" he added.

For a moment Barron stared at him. Then the genial smile and an unconscious desire for sympathy brought the young fellow's troubles bubbling to the surface.

"I don't know, sir. But I can't seem to get on, somehow. Lots of fellows my age who married about the time I did have a lot more than I have. I can't seem to give Minnie the things I'd like to give her—the things those other fellows give their wives. Guess that's why I look worried!" he finished with an apologetic smile.

Old Hammerhead nodded thoughtfully. Then he leaned forward in his chair and spoke in a confidential voice. "Barron, I'd like to ask you a personal question, but don't answer it unless you feel like it. It's this. You have a pretty nice little home, haven't you? And you and your wife are pretty happy together, aren't you, aside from the little everyday squabbles that come to all of us?"

The young fellow smiled. "Yes, sir." "Well, you've got a lot out of life then, Barron!"

"But I want to ask you another question. You want to get on in the world, I know. We all do. But I'd like to know just *why* you want to get on in the world?"

"How do you mean, sir?"

"Why, I mean, do you want to get on in the world for the sake of doing some good in it? For the sake of being a man who has made the world a little better than he found it?"

"Yes, sir, I think so."

"Or do you want to get on and earn more money, just because you want to buy yourself and your wife a few more

of the luxuries that you see the other fellows buy their wives?"

"Why, I guess I want that too, sir."

"Well, Barron, I used to want that, too. And now I've got it. And take it from me, I don't want it. In fact, I don't do it. I'd venture to wager that my wife and I live just about as simply as you do!"

"It's a funny thing, but most of us figure that the pleasantest things in life are the hardest to get; that the pleasantest things are the most costly. But they're not, Barron."

"You can't buy happiness. You can't buy love. And did you ever stop to think that about the pleasantest and most satisfying thing there is is a glass of cold water? Try it some time when you're thirsty. And another of the things that are the very best of all is a walk in the country in spring time. And that doesn't cost anything either, Barron."

"But the things that are really worth while are hard to get in another way, young man. Because in order to enjoy them, you've got to have the right point of view. And that's hard to get."

The old man broke off for a moment. "Now, Barron, we all have opportunities to do worth while things. And you've got one right now. You've got the chance to make a place for yourself in this organization. You've got a chance to radiate the kind of spirit among the drivers and mechanics that will lift them out of their daily troubles. And to do that you've got to forget your own. You've got to forget that you haven't all the luxuries you want and begin thinking about how you can help the men under you. If you do that and keep on doing it, you will be so valuable to the firm you work for, no matter who it is, that they will insist on you're taking money enough for all the luxuries you don't want. But in the meantime, you'll be doing something worth while. That's the main thing!"

# Profits with a Sight-Seeing Bus

**Cost Figures Show:—** Each Passenger Pays \$1.00  
Each Passenger Costs \$.2355

**An Instructive Analysis of Bus Operating Costs Compared with the Profits Therefrom**

**D**O sight-seeing buses pay well? At least one operator of such a bus says they pay very well indeed. And he has the accurate cost figures to prove it.

Many a fleet or truck owner believes that his vehicles are paying him very well, or are reducing his operating costs to a considerable extent. But unless he keeps accurate costs he cannot be sure. And it is better to be sure than sorry.

A comparison between the gross profits of a sight-seeing bus and the costs of its operation is particularly interesting; first, because it illustrates the net profits which can be and are being made with these vehicles, and, second, because the commodity carried differs from the usual truck load in that it is much less dependable.

That is, an operator who uses his trucks for freight collections or deliveries, or one who makes retail deliveries with his trucks, usually can depend upon a certain pretty definite minimum of goods for his vehicles to haul.

But with a bus it is different. The owner speculates in the commodity he will have to haul from day to day, just as the commercial hauler speculates in the amount of outside haulage he will be able to find for his vehicle from month to month.

Both can only guide their fortunes to the extent of settling and operating in a promising locality in the first place and running their business in an efficient way in the second.

## Three Trips Per Day

Therefore the experience of such an operator is interesting, as showing how a big success can be made from a business, apparently as speculative as a sight-seeing bus.

The operator is Charles L. Cook of the Charles L. Cook Bus Co., Milwaukee. Mr. Cook's own words on the operation of his bus are of interest:

"Running a sight-seeing bus is a profitable business, if you have a good bus and run it properly.

"Because there is money in the business, there is a lot of competition. One of the main things is to get the jump on your competitors. This requires a dependable chassis and an attractive and dependable body. On July 1, 1920, I purchased a 2½-ton Atterbury chassis with a long wheel base. I chose the

Atterbury because I was already operating two Atterburys and knew the truck was O. K.

"I designed a body myself and had it O. K'd by the Atterbury people before I had it built.

"Every afternoon, including Sunday,

the bus meets the Goodrich boat when it comes in from Chicago. Shortly after the boat is docked, my bus is loaded to capacity.

"My bus is always loaded and on its way long before any of the other buses are half full. It takes a little over an

The Commercial Vehicle—Truck Cost System			
Period <u>July 1-Aug. 13, 1920</u>			
Make of truck <u>Atterbury</u>		Gasoline <u>Standard</u>	
MONTHLY COST SUMMARY SHEET			
U. P. C. BUCK COMPANY, INC. 243 249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline	314 gals.	\$.29	\$ 91 08
Current	kw h		
Oil	88 qts.	\$.18	15 84
Grease	lbs		
Kerosene	gal.		
Waste	lbs		
Dist. Water	gals.		
Driver	44 days	\$5.71	251 24
Helper	days		
Mechanic	hrs		
<b>A Total Operating Charges</b>			\$ 358.16
<b>Maintenance Charges</b>			
Tires	2200 mi.	\$.0187	\$ 41 14
Repairs			
Overhauling, painting, etc.	2200 @ \$.0274		60 28
Special vehicle rental			
Garage rental (flat rate)	@ \$192 per year		23 15
<b>B Total maintenance charges</b>			\$ 124.57
<b>Fixed Charges</b>			
Insurance, fire	\$260	per year	\$ 31 34
Liability		per year	
Collision		per year	
Interest	0	(On item 1) pro rata	37 88
Depreciation on chassis			
Depreciation on body		\$.1381 per mile (2200 miles)	303 82
Depreciation on equipment			
Depreciation on tires			
Total taxes and licenses	@ \$220. per year		26 52
<b>Administrative Overhead @ \$130 per year</b>			88 00
<b>C Total fixed charges for 44-day period</b>			\$ 487.56
			970.29

The Operating, Maintenance and Fixed Charges for a period of 44 days on a sight-seeing bus are shown on the above sample cost sheet. Note that with a vehicle engaged in this type of work, the Fixed Charges greatly predominate over the other two. This is due to higher interest and depreciation, to higher taxes and to administrative overhead.



hour for the bus to cover the sights of Milwaukee and return to its starting place, having travelled 16 or 17 miles. In addition to the passengers obtained from the steamboat, there are usually enough other visitors to Milwaukee to fill the bus for two more trips a day.

Income from Passengers

"I average a full load of 28 passengers. As each passenger pays one dollar, the bus takes in a total of \$28 per trip, or \$84 for the three trips made each day. "The sight-seeing bus business in Milwaukee is good for about 5 months in the year, making my total income about \$12,600. If I lay the truck up during the winter, the annual cost of operation would be about \$4,273, which is the daily cost for 3 months, plus depreciation, etc., over the entire year. Subtracting this from the gross income of \$12,600, leaves a total net income of \$8,327 per year.

"It seems to me, however, that it is poor business to allow a \$7,856 invest-

What the System Costs

On these two pages are shown filled-in sample sheets of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

ment to stand idle for 7 months in the year and I am figuring on a way to keep the truck busy all winter.

"In a city the size of Milwaukee, with a population of 525,000, there are between 25 and 30 funerals each day. My bus is so well known for its appearance and comfort that I figure I can get at least three funerals every day.

"With 28 passengers, each time, at \$1 apiece, the truck would be earning \$84 a day the year round."

If Mr. Cook is successful in obtaining these three funerals each day for his bus, the resultant net profit will be startling.

In the first place, the present cost per day of operating the bus in sight-seeing is \$22.05, as the cost sheet on page 315 shows. But this allows for a run of 50 miles per day, and the probabilities are that the bus would not cover nearly so high a mileage in the funeral work. This would increase the profit considerably.

But even taking the \$22.05 per day as a basis on which to figure profits, the entire yearly cost of the bus would not be more than 365 times \$22.05, or \$8,048.25.

Of course, the bus could not operate the full 365 days, as there would be several days in which it had less than full capacity business and others in which it would be laid up for repairs, painting, etc.

Show Big Profits

But even allowing for these days, the bus shows a big profit. Making a liberal allowance for the days laid off, suppose the bus worked a full 300 in the year at full capacity. At \$84 a day, this means a gross income of \$25,200 per year.

Taking the total yearly cost as \$8,048.25, this leaves a yearly net profit of \$17,151.75. Surely a remarkable profit for any single vehicle!

A study of the costs themselves is also of interest. On the left hand sheet, the operating and maintenance charges are about normal. The tire charge is a little too low perhaps, although the bus is equipped with Sewell wheels, while the charge for repairs is perhaps too high, the actual repairs being nil. Generally speaking, however, these charges are about normal.

But in the fixed charges, depreciation is much higher than usual for a vehicle of this capacity, owing to the high original cost; so is interest, for the same reason. There is also the large overhead administrative charge, to say nothing of high taxes and license charges.

On the right hand sheet the principal items of interest are the costs per day operated and maintained, which are the same. Also the high cost per mile. Here, too, the cost per passenger is of interest as compared to the \$1 received from each passenger.

These cost figures are of interest to any business man who operates or contemplates operating a passenger bus, because they illustrate how profits can be made with such a vehicle.

But they are of greater importance still if they bring home the fact that accurate costs must be kept in any business.

The Commercial Vehicle—Truck Cost System

Number of Truck 1. (Bus)  
Capacity in lbs 5000  
Class No.

MONTHLY COST SUMMARY SHEET U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK

Investment	
Cost of chassis, less tires	3400 00
Cost of body	3700 00
Cost of <del>equipment</del> Freight and tax	456 00
Cost of tires	300 00
1 Total cost—complete	7856 00

Performance Record	
2 Days operated	44
3 Days idle	0
4 Days maintained (Item 2—Item 3)	44
5 Total hours operated	176
6 Total miles covered	2200
7 Total trips made	132
8 Total <del>tons or packages or stops</del> passengers	3696

Performance Averages	
9 Average miles per day maintained (Item 6—Item 4)	50
10 Average miles per day operated (Item 6—Item 2)	50
11 Average miles per trip (Item 6—Item 7)	16.67
12 Average <del>tons or packages or stops</del> passengers per trip (Item 8—Item 7)	28
13 Average commercial <del>ton-mile, package-mile or stop-mile</del> passenger-miles (Item 11 x Item 12) / 2	233.33

Recapitulation	
14 Total expenses for month (Sum of Items A, B and C)	970.29
15 Cost per day operated (Item 14—Item 2)	22.05
16 Cost per day maintained (Item 14—Item 4)	22.05
17 Cost per mile operated (Item 14—Item 6)	.441
18—Total commercial ton-miles, package-miles or stop-miles (Item 7 x Item 13)	30800
19—Cost per commercial ton-mile, package-mile or stop-mile (Item 14—Item 18)	.0315
20—Cost per passenger (Item 14 : Item 8)	.2355

Recapitulation on costs of operating and maintaining the sight-seeing bus. Note the high original investment, which greatly increased interest and depreciation charges on the opposite sheet. The recapitulation shows a high cost per mile but a low cost per passenger-mile. As each passenger pays a dollar and the cost per passenger is \$.2355, the profit is about 300 per cent

# The Better Way

To Save Time in Truck Repair and Maintenance

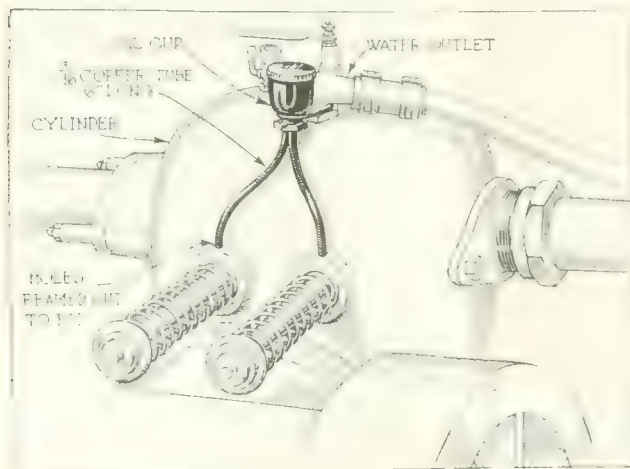
## No. 470—Cutoff Switch for Shop Grinder

TO avoid unnecessary running of the shop grinder with the consequent waste in electric energy and corresponding charges for the current, a switch arranged as shown in the accompanying illustration is simple to apply and stops the running of the grinder when a tool or other part is not being ground. This consists of a knife type switch, the usual type as in circuit with the motor, held out of contact by means of a coil spring.

A piece of sash cord or small wire leads from the blade of the switch to a pulley and treadle fixed to the floor near the base of the grinder. This treadle is positioned convenient for the person using the grinder to place one foot on it while holding the tool against the wheel. Immediately the operator steps back the coil spring pulls the blade out of contact and stops the wheel. This fixture will rapidly pay for itself in saving of current.—W. BAILEY, Chicago.

## No. 471—Eliminating Stuck Autocar Valves

AUTOCAR truck owners who have experienced trouble with sticking valves will find a remedy in the use of a kerosene cup. This should be fastened to the water connection, as shown in the accompanying illustration. Two 6-in. pieces of 3/16-in. copper tubing are soldered into the cup. Holes are then reamed out in the valve guides to fit the copper tubing into. The cup is filled once a day.—H. N. STEVENSON, Trenton.



No. 471—Stuck Autocar Valves

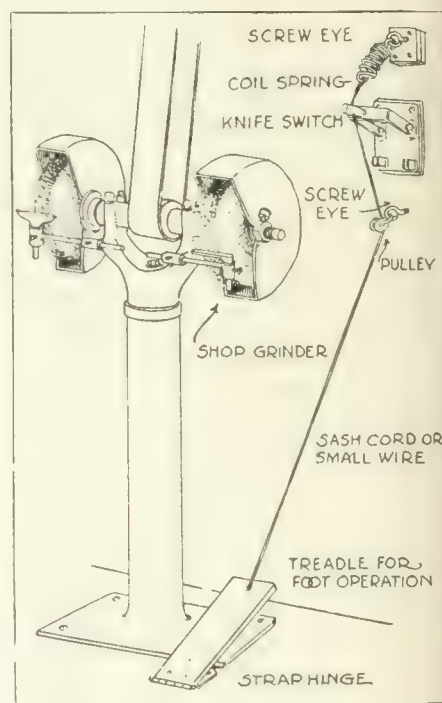
*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better method of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

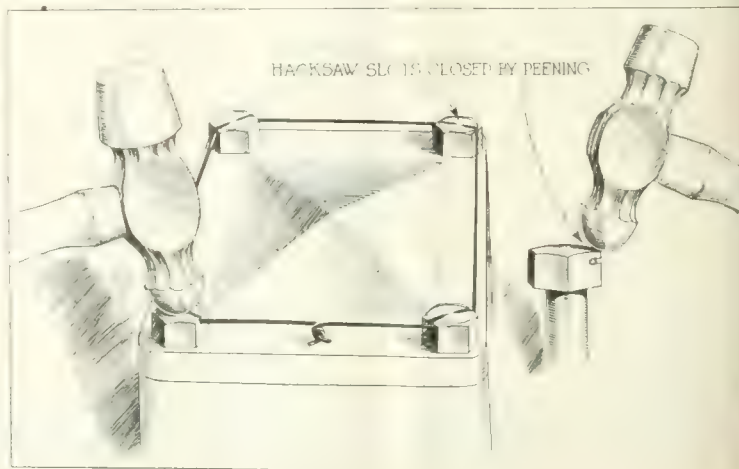
## No. 472—Securing Cap Screws With Wire

CAP SCREWS used on ring gears, differential joint cases, starter and generator brackets, etc., will invariably work loose unless these are wired to prevent them backing out. To drill a hole with a small drill through the heads of cap screws is tedious and invariably re-

sults in broken drills unless a jig is used. To avoid drilling and yet obtain a satisfactory method of locking either a slot through the side of a hexagonal head screw or on the top of a hexed head can be made with a hacksaw in a short time. A wire is then placed through these slots and the head closed down on it with a punch or a hammer. With screws having a screwdriver slot no slotting is required. Simply let the wire into the slot and peen the center of the

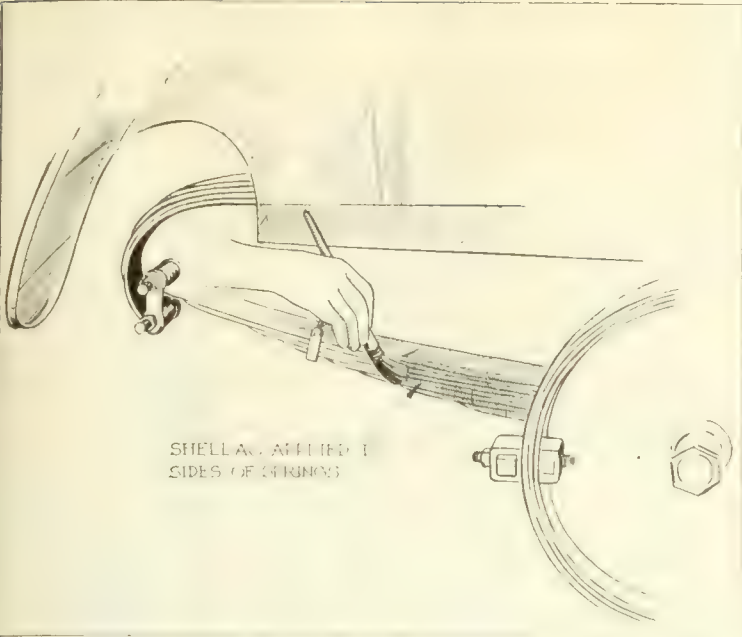


No. 470—Cutoff Switch

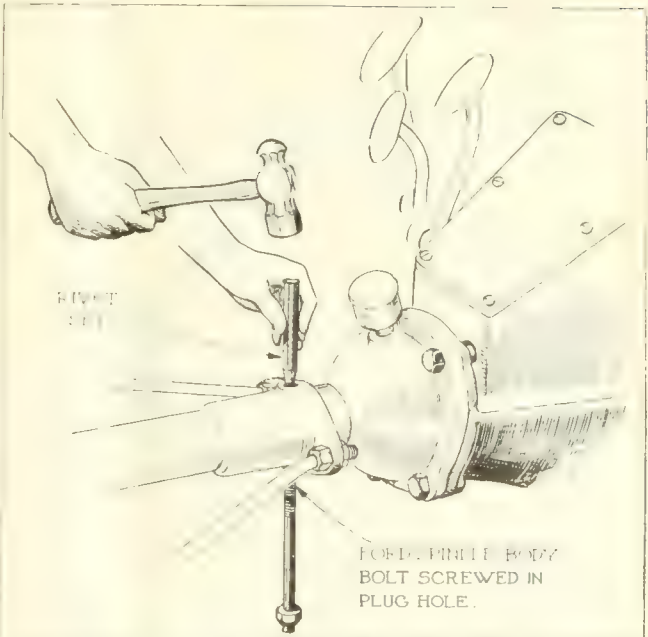


No. 472—Securing Cap Screws with Wire





No. 475—Shellac on Springs



No. 473—Riveting Ford Joint Pin

slot down on the wire. This makes a secure job and avoids the possibility of these screws working out and causing trouble due to neglect to secure them.—J. WOOD, Newark, N. J.

**No. 473—Riveting Ford Universal Joint Pin**

TO form an anvil for riveting the Ford universal joint pin, the lower plug is removed and a steering spindle bolt screwed in, the pin being first turned to the right position. A punch is then used to do the riveting through the grease cup hole.—B. O. WORSTER, Old Point Garage, Madison, Me.

the drill point, causing the widest cutting lip to turn a circle about this center. By running the drill fast and not crowding it too much, a 3/4-in. drill can be made to cut 1/32 in. oversize.—C. S. WELLS, New York City.

**No. 475—Keeping Grease in Springs with Shellac**

AFTER the springs have been cleaned and greased, they are washed off on the outside with gasoline and a good heavy coat of shellac applied to the outside and inside. This keeps out the water and the grease lasts longer.—PERCY WYLLIE, Connell Bros., Elmira, N. Y.

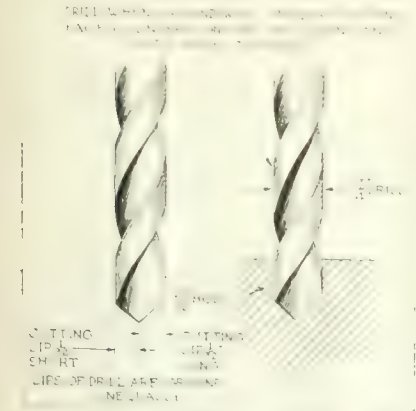
**No. 476—Lag Screws Used for Rim Rack**

A RACK for rims is made by cutting the heads off a number of lag screws, bending the screws about 1 in. from the end and screwing them into

the wall about 6 or 8 in. apart, 30 in. from the floor. The rims are hung on these hooks by the valve stem hole.—B. L. COHEN, Cord and Fabric Tire Repair, Buffalo, N. Y.

**No. 477—Holding Wood in Place with Drill Press**

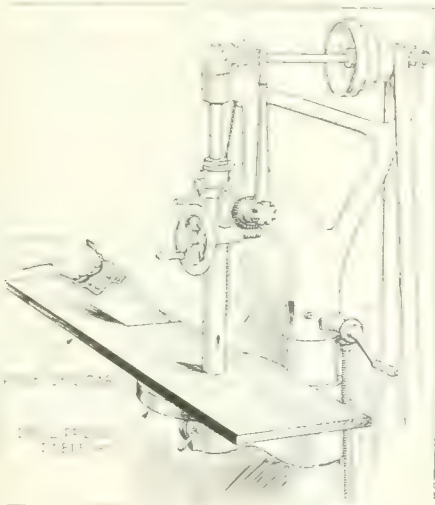
WHEN sawing a piece of wood a vise is not always handy. A drill press can then be used to hold the wood in place. It can also be used as a table if a board of suitable size is available, as illustrated.—CHARLES BOEHME, Gobel's Garage, Brooklyn, N. Y.



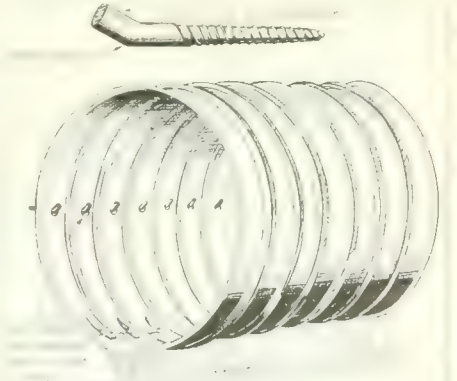
No. 474—Drills for Oversize Holes

**No. 474—Grinding Drills for Oversize Drilled Holes**

FREQUENTLY a drilled hole is required for which purpose a drill the exact size is not available. An undersize drill can be made to drill oversize under these conditions by grinding the cutting lips of the drill unequally. The reason for this is due to the drill centering on



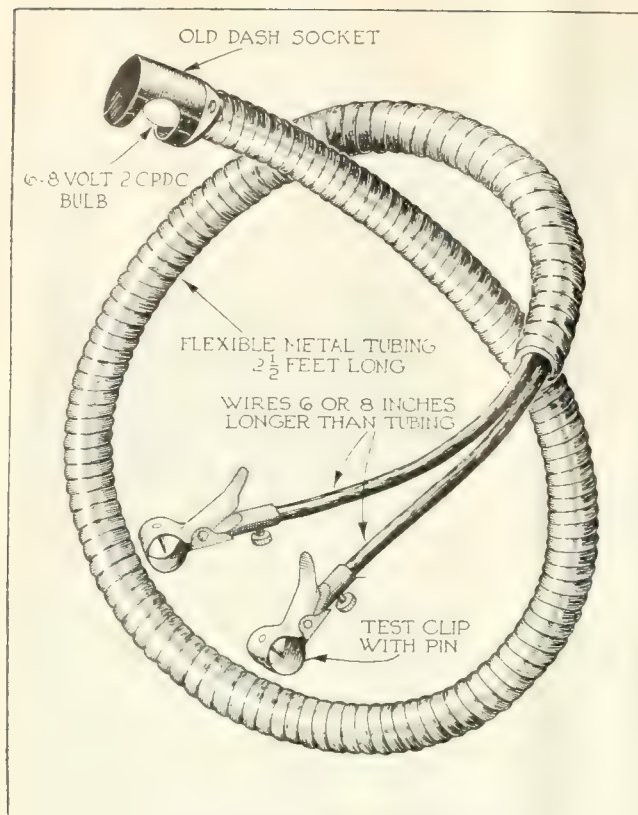
No. 477—Holding Wood in Place



No. 476—Lag Screws for Rim Rack

**No. 478—Test Lamp Made in the Shop**

IN order to construct the useful little test lamp shown in the accompanying illustration, take an old dash socket, of the type used for lighting the instruments on the dash-board on trucks which operate at night, and put a 6-8 volt bulb in it, double contact. Have your connecting wires about 3 ft. long



No. 478—Test Lamp Made in Shop

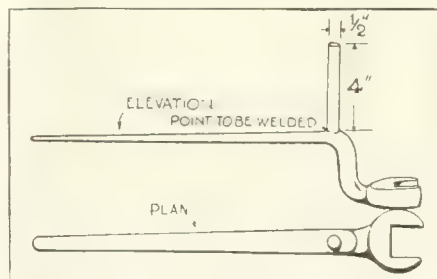
and run them both through a piece of flexible metal tubing. The flexible tubing should be 6 or 8 in. shorter than the wires, so that the latter project. The clips on the ends of the wires are of the test clip type, with pins in the center, to penetrate through the insulation on the truck wires which it is desired to test. The dash socket answers the purpose of a shield for the bulb. This little apparatus will be found a great convenience in electrical testing and repair work.—E. F. HASSETT, Brooklyn, N. Y.

#### No. 479—Using Ford Cap-screw Wrench

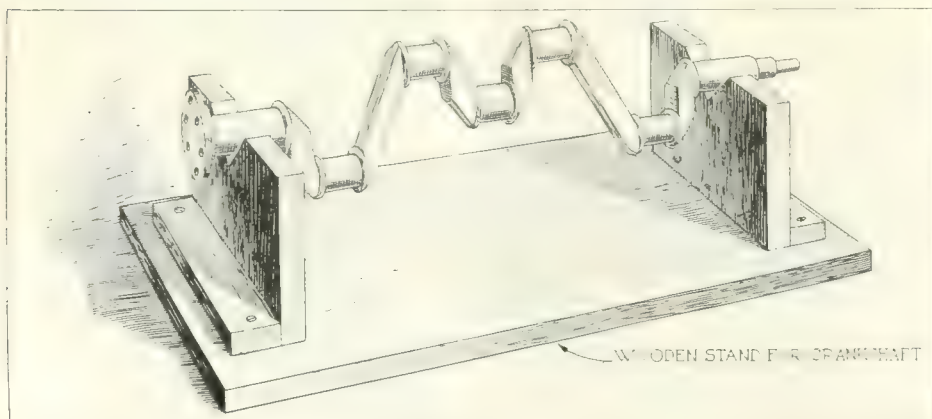
WHEN using the regular Ford fly-wheel cap screw wrench, considerable difficulty is experienced in keeping the wrench from twisting in such a way that it is a very slow and tedious process,

especially after the screws have been cut several times.

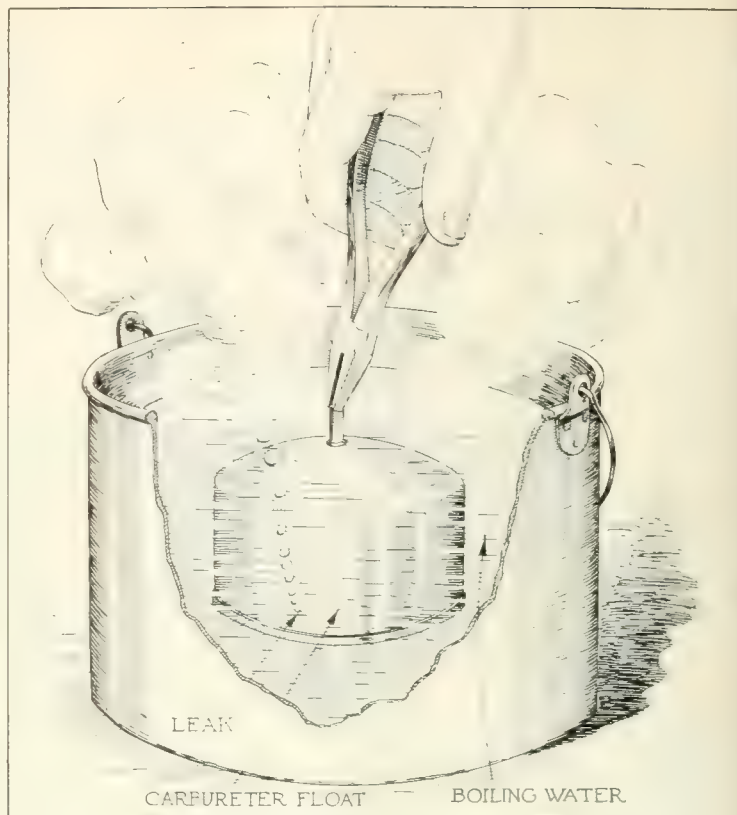
This can be done much quicker and the screws set up closer, if a piece of 1/2-in. steel rod about 4 in. long is welded to the wrench. This rod can be securely held in one hand while using the wrench, thereby preventing all



No. 479—Ford Capscrew Wrench



No. 481—Stand for keeping crankshaft clean



No. 480—Finding Leak in Metal Float

tendency of the wrench to twist up off the screw head. It not only makes the work easier, but also protects both cap screw head and wrench from being mutilated, besides saving considerable skin on the mechanic's knuckles.—J. NELSON, Jacksonville, Fla.

#### No. 480—Finding a Leak in a Metal Float

WHEN a carburetor does not operate the trouble is sometimes caused by the fact that the metal float has sprung a leak and has filled with gasoline so that it ceases to function as a float. When the trouble is discovered, through finding the float full of gasoline, it is nevertheless difficult to locate the leak, if the leak is a small one. However, putting the float in a pail of boiling water will vaporize the gasoline and cause bubbles to pour out of the leak so that the latter is easy to locate. The heat causes pressure in the float and if the latter is taken out and turned upside down the gasoline will be forced out. Then solder the leak.—E. F. HASSETT, Brooklyn, N. Y.

#### No. 481—Stand for Keeping Crankshaft Clean

QUITE often after a mechanic has cleaned off a crankshaft with kerosene and laid it on the floor or bench, he will find that dirt has collected on it. The accompanying sketch shows a suitable stand on which to mount the crankshaft, thus eliminating the possibility of floor dirt, etc. collecting on it.—CHARLES BOEHME, Gobel's Garage, Brooklyn, N. Y.



# Buyer's Department of The Commercial Vehicle

## Speeding Up Loading

### Many Uses for Scoop Conveyor

THE loading of coal, ashes, sand, stone, bags, boxes or other loose materials is usually a time and labor consumer that is not commensurate with economy in truck operation. Fleet owners who are interested in the subject of cutting down operating costs by economical loading will find a suggestion in the Scoop Conveyor made by the Portable Machinery Co., Passaic, N. J.

Under ideal conditions one man, it is stated, can load a 3-ton truck in 3 min. with this conveyor. Under average conditions it requires from 5 to 10 min., depending on the height of the storage pile and the size and natural flow of the material handled. The carrying capacity of both the 12 and 16-in. width conveyors, fitted with either high flight or low

cleat belt, is 1 ton per minute providing the trough is kept even full. For handling material containing cubes measuring over 8 in. in size, the manufacturer recommends the 16-in. width machine which has the belt speed reduced in proportion to the 12-in. width, giving both machines the same capacity.

The predominating feature of the conveyor is the feed end which can be pushed and completely buried into the material to be conveyed, thus allowing the material to be scraped onto the carrying belt instead of being lifted by shovel into a feed hopper. This saves about 50 per cent of labor in feeding.

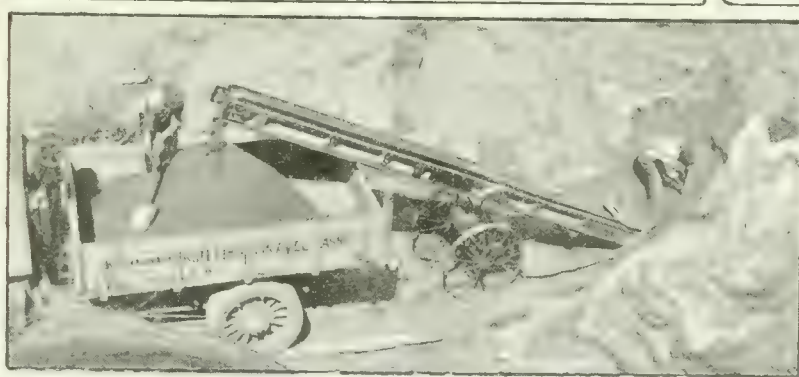
The low cleat belt will handle materials that do not roll readily. Material carried is held together by the continuous

skirt plates and will not roll backwards. The high flight belt will handle materials inclined to roll backward. It will also handle fruits or vegetables without cutting, chafing or bruising them.

In retail coal yards, this conveyor will handle all sizes of coal. The machine is readily moved from one bin to another. The wheels are away from the coal pile and do not crush the coal. There is no coal breakage in picking up or discharging to screen. The 20-ft. machine with screen attachment is suitable to load trucks measuring up to 6 ft. in height. Without screen attachment, which can be readily removed, it will load trucks measuring up to 8 ft. in height. The 24-ft. machine with screen attachment is suitable for loading trucks measuring up to 9 ft. in height.

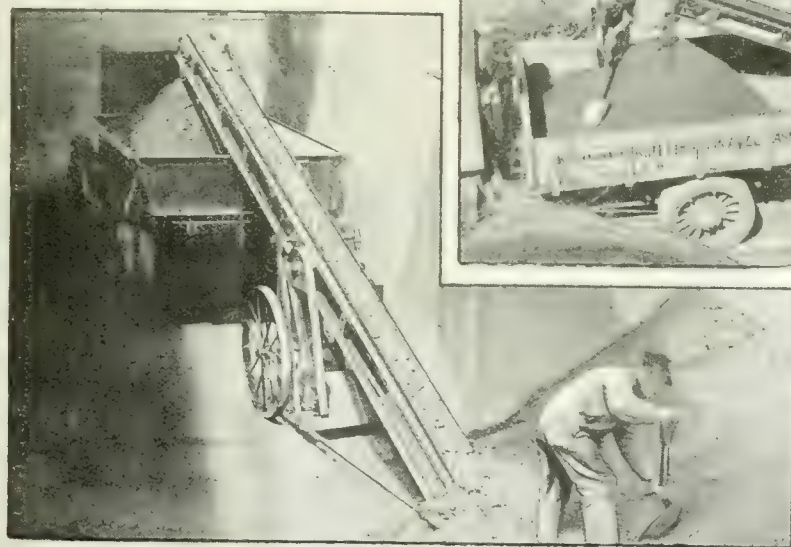
Under ordinary conditions, the cost of electric current to operate the motors fitted to the various size conveyors is from 4 to 6 cents per hour. If operated with a gasoline engine, it requires from 2 to 4 gal. per 10 hrs.

1



2

3



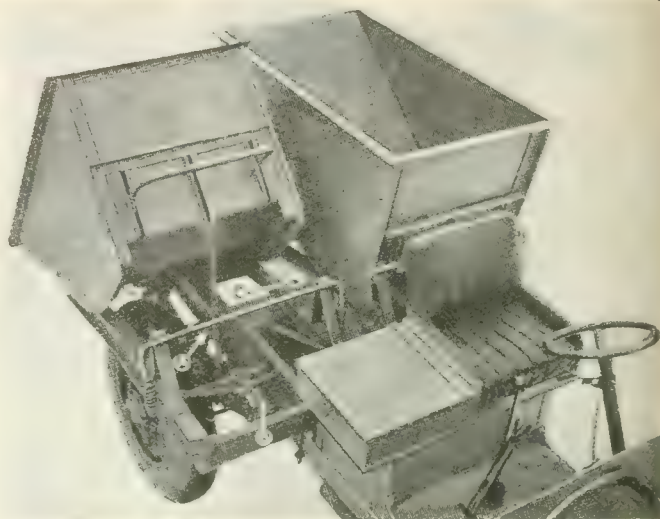
Views of the Scoop Conveyor in use. It can be transported on a 1½-ton truck as shown in Fig. 1. Quick and labor-saving loading is possible as shown in Figs. 2 and 3

# Buyer's Department of The Commercial Vehicle

## New Diamond T Model

### Contractor's Special

#### Equipped with Two Lee End-Dump Hoppers



View of Diamond T Contractor's Special, showing construction details of body

TO meet the demand for dump truck equipment for road building the Diamond T Motor Car Co., Chicago, has brought out a new worm-driven Contractors' Special model which, it is claimed, will save from 25 to 50 per cent over the older, conventional methods of distributing sand, gravel, crushed rock and cement where equipment used varied from 1 to 5-ton units.

This new model is equipped with two Lee end-dump hoppers constructed of No. 10 gage steel throughout, each having a capacity of 1 cu. yd., giving a total load capacity of 5000 to 6000 lb. The short wheelbase enables it to turn easily on an 18-ft. sub-grade. It is fitted with pneumatic cord tires, 34 by 5 front, 40 by 8 rear, which allow operation on soft ground and protect sub-grades from being broken down. The smaller size tires in front decrease the turning radius, and the weight is supported just

as safely as though larger tires were used, because practically all of the load is carried on the rear axle.

All moving parts are completely housed and protected from dust, dirt and grit. A metal shield mounted be-

#### DIAMOND T SPECIFICATIONS

Capacity, tons.....	2
Tires, front.....	34 x 5
Tires, rear.....	40 x 8
Bore, in.....	4
Stroke, in.....	5 1/2
N.A.C.C. hp.....	25.6
Speed, r.p.m.....	1800
Speed, m.p.h.....	25
Gear ratio in high gear.....	4.75 to 1
Final drive.....	Worm

tween the central members of the hopper carrier protects the worm-housing and universal joints from the hopper overflow. The hoppers travel on a studded track insuring proper align-

ment at all times. Auxiliary springs, shown at A in the accompanying illustration, carried on each frame member and resting on the spring box prevent spring rebound and relieve sideways when only one hopper is filled. To dump the hopper, a safety lock is released by simply raising a trip bar. Gravity does the rest. The dumping shock is absorbed by a coil spring, B, mounted on the forward member. The tilt of the hopper is regulated by a control chain.

This truck can be used not only as a construction unit, but may be used also for maintenance and repair, the dual hoppers permitting distribution of the load at several repair points.

The truck hook-up is so designed that that the load is properly balanced even when operating on a steep incline. The frame cross members have been placed to give the hoppers proper support. Simplicity in design has been combined with



The dual hoppers are constructed of No. 10 gage steel throughout



The short wheelbase enables the truck to turn on an 18-ft. sub-grade



# Buyer's Department of The Commercial Vehicle

sturdy, rigid compact construction. Non-essential accessories are eliminated. A step bracket takes the place of the runningboard. It has a single seat only, the space usually used for the second occupant is taken up with a large roomy receptacle for tools.

Other units include an A. O. Smith pressed steel frame; G. & O. vertical finned tube type of radiator; Stromberg carbureter; Covert clutch and gearset; Timken front and rear axles; Mather half-elliptic springs; Gemmer steering gear and Spicer universal joints.

The Alemite process of forced lubrication is used in connection with all spring shackles. Oilless bushings (bronze impregnated with graphite) are used as bearing surfaces for the brake cross

shafts, starting crankshaft, and foot pedals.

Equipment includes a hub-odometer, radiator guard, one tow hook front and rear, front fenders of extra heavy steel, oil side and tail lights, warning signal, complete set of tools, jack, tool box and one-man seat with special cushion.

The Contractors' Special has a four-cylinder engine, four-speed gearset, pressure-feed lubrication and a cooling system which circulates water around every cylinder, valve stem and valve seat. The three-point suspension engine, supported in the rear by two ball and socket joints allowing free everyway motion, protects the crankcase, crankshaft and bearings from being injured by road distortion.

The Hinkley engine used in this new model has been designed for heavy duty truck performance. It is a unit power-plant cast in block with the valves all on one side. The combustion chambers, intake passages and special "Dri-gas" manifold are designed for utilizing the present low grade gasoline. The carbureter is equipped with an air strainer to prevent dust from entering the combustion chamber and scoring the cylinders and bearings. The engine is lubricated by a pressure system. Ignition is taken care of by a Bosch high-tension magneto with hand spark control. A special governor built into the engine is included in the equipment. Gasoline is fed by vacuum from an 18-gal. tank located under the seat.

## Yellow Cab Co. Enters Truck Field with Two Models

### Two Speed Models of ¾- and 1¾-Ton Capacities

THE Yellow Cab Mfg. Co., which has several years concentrated its efforts on turning out 2000 cabs yearly for use in taxicab service in Chicago and other cities, has entered the truck field with two models, of ¾- and 1¾-ton capacities. Both are speed models.

With the exception of tire sizes, wheel-base, gear ratios, and brake dimensions, the two models are identical in design and assembly, using the same size engine.

The units included in the assembly are of well known make and include the following: A. O. Smith frame; Standard wood wheels; Continental engine; Long radiator; Bosch high-tension magneto; Zenith carbureter; Brown-Lipe clutch and gearset; Timken front and rear axles; Mather springs; Gemmer steering gear; and Spicer universal joints.

The frame is made of pressed steel and is of flexible construction. The four-cylinder engine is cast in block with the valves at the right. Water is circulated by a thermo-syphon system through a vertical-finned tube type of radiator with a pressed steel case. Spark control is fixed. Fuel is fed by gravity from a tank located under the seat. Engine lubrication is taken care of by a circulating splash system.

The clutch is of the multiple disk-oil type, the clutch facing material being fabric. The selective three-speed gearset is a unit with the powerplant. Propulsion is taken through the half-elliptic springs while driving torque is taken through the torque arm. Final drive is spiral bevel.

Both the foot and hand brakes are



The Yellow Cab ¾ and 1-ton trucks are assembled from standard units

#### YELLOW CAB SPECIFICATIONS

Capacity, tons	¾	1¾
Price	\$2,050	\$2,150
Wheelbase, in.	116	136
Tires, front	33x43	35x45
Tires, rear	33x43	35x45
Bore, in.	3¾	3¾
Stroke, in.	5	5
N.A.C.C. hp.	22.5	22.5
Gear ratio in high gear	4.9 to 1	7.2 to 1
Final drive	S-Bevel	S-Bevel

located on the rear wheels. The hand brakes are of the internal-expanding type. The foot brakes on the ¾-tonner are of the external-contracting type and on the larger model they are internal.

### Ruggles Forms Truck Company

SAGINAW, MICH., June 3—Following the completion of the organization and the election of officers, announcement was made here last week of the formation

of the new Ruggles Motor Truck Co. of this city with a capitalization of \$2,000,000 to manufacture a light truck and a 2-ton truck which will be followed ultimately by a complete line of trucks.

Frank W. Ruggles, former president and general manager of the Republic Motor Truck Co., Alma, Mich., is president of the company. Mr. Ruggles is recognized as a leader in the motor truck industry. Under his guidance the Republic company grew to be the largest motor truck manufacturers in the world. The new company has ample financial backing and with Mr. Ruggles' truck manufacturing knowledge and experience the new Saginaw enterprise looms as a new giant in the truck field.

Production on the new models will start immediately and the first truck models, it is expected, will be ready for showing in July.



# Buyer's Department of The Commercial Vehicle

## Millers Falls Jack

THIS is a roller bearing, ratchet jack, that will lift 15 tons. The bearings are in a cage in the base and operate between two hardened steel disks. The ratchet operates either to right or left by simply turning the knurled ratchet pawl. The concave steel cap is set fast to the screw and both remain stationary while the barrel revolves around the screw. The king bolt passes through the stationary base into the barrel and revolves with it. The screw has a perfectly cut acme thread which meshes with the barrel. When the screw reaches its topmost point the stop pawl automatically prevents its being turned out of the barrel. The concave shape of the cap adapts it to any shape of axle or other surface. The ground base gives solid footing regardless of conditions. The maker is the Millers Falls Co., Millers Falls, Mass.

## Benford Hy-Power Timer

WHEN a Ford camshaft bearing wears and the camshaft wobbles, it is impossible to get a fair engine performance due to uneven wear in the contact points of the timer. The Hy-Power timer with its finely tempered spring and the sliding shoe compensates for the wobbly action of the camshaft and, it is stated, thus gives an unfailing fiery spark at all times. The convex contacts are case-hardened and there is no uneven wear. The price is \$1.50. The maker is the Benford Auto Products, Inc., Mt. Vernon, N. Y.

## Deluxe Piston

THIS is a braced or ribbed piston made of gray iron, giving light weight as well as strength. A system of reinforcing ribs in the head and extending the full length of the skirt permits the use of less metal, in the Deluxe piston, and prevents warping. These reinforcing ribs are cast as an integral part of the piston. In addition to strengthening the piston, these ribs conduct the heat away from the head, down the skirt of the piston, causing the engine to run much cooler.

These pistons are now made in standard and oversize for more than 900 makes of motor vehicles. The maker is the Clark-Turner Piston Co., Los Angeles, Cal.

## Hart Staggered Roller Bearing

EMPLOYING a series of short rolls, staggered about the periphery of the raceway, the Hart bearing represents a distinct departure from the conventional roller bearing design as an anti-frictional method of efficiently carrying large radial loads. These rolls are made of high carbon, high chrome steel, hardened and ground, and operate between two race-

## Truck Accessories

ways of the same material. The rolls are mounted axially on steel cage pins, with a suitable running clearance. The cage pins are riveted to steel end rings and the ring, pins and rolls constitute the roller assembly which operates between the raceways. The distance between the end rings is slightly greater than the sum total of the length of the various rolls in any combination.

The spaces or pockets between the rolls serve as oil reservoirs which feed the lubricant zig-zag to the periphery of the rolls, to the space between the rolls and cage pins, and to the faces of the cage rings. The maker is the Hart Roller Bearing Co., Orange, N. J.

## Slip-On Ford Body

TO meet the requirements of salesmen and tradesmen who use Ford roadsters and need an enclosed body which affords protection to their samples or goods, the Martin-Parry Corp., York, Pa., and Indianapolis, has recently brought out a new steel panel body of the slip-on type.

This body is designed so that it is easily mounted on the chassis by removing the regular rear deck of the roadster and fastened in place by means of special bolts furnished with the body. In this manner, the Ford roadster is converted quickly into a combination commercial and passenger car, ready for business. This company also manufactures an open style express slip-on body for Fords.

## Rose Piston Ring

EACH ring is cast separately. The construction is such that the pressure is said to be uniform all around the periphery of the ring. It is manufactured in all standard sizes and oversizes of .005, .010, .020 and .031 in. The price for the 2 to 3 15/16 in. sizes is 50 cents; 4 to 4 7/16 in., 60 cents; 4 1/2 to 5 in., 75 cents. The maker is D. F. Rose, 117 West 63d Street, New York City.

## Standard Speedometer for Fords

THIS device is designed to fit in the narrow Ford instrument board without the use of special brackets or hangers. It has a 10,000 mile season register that repeats automatically, 100 mile trip that can be reset in 5 sec., and an etched dial with large white numerals that are easily read. The price complete with fittings is \$18. The maker is the Standard Thermometer Co., Boston.

## Ro-Gas-Filter

THIS small device is made from brass with a glass cylinder inside which is a chamois filter, held taut and in shape by a wire frame. It is attached anywhere on the gas feed line, between the tank and the carburetor. By the removal of all dirt and water from the gas, the Ro-Gas-Filter it is claimed will give greater mileage. The price is \$6. The maker is the Roll Mfg. Co., Fond Du Lac, Wis.

## Simplicity Steel Horses

THE feature of these horses is that they do not interfere with the mechanic. Furthermore, they release floor and overhead cranes for other uses. The offset feature allows the removal of the entire rear end assembly. The horses are adjustable from 12 to 28 in. The weight per pair is 45 lbs. The price is \$7 each. The maker is the Simplicity Products Co., Milwaukee, Wis.

## Kimkin Universal Tow Bar

THE main saddle or axle clamp is attached to the bar through a swivel. The end of the bar clamps on the tie rod so that when the towing car makes a turn, the wheels of the car, being towed, are also turned. This bar cannot be used on a car with an irreversible steering gear without disconnecting the drag link. The price is \$25 and the makers are Kimmerle Bros., 683 Golden Gate Avenue, San Francisco, Cal.

## Simplicity Towing Pole

THE fork on this towing pole attaches to the front axle on the lower side and is fastened by locking screws. The ball and socket oscillating swivel allow a short turning radius. The pole can consequently brake the truck, being towed. The finish is black and enamel. The weight is 40 lbs. The price is \$16 and the maker the Simplicity Products Co., Milwaukee, Wis.

## Vacuum Oil and Gas Saver

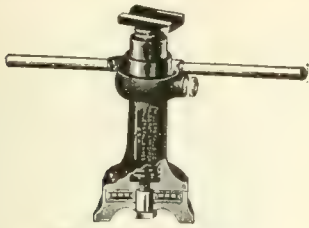
THIS device is said to create additional vacuum at the needle valve which makes it possible for the needle valve to be turned back from the ordinary running position. This is said to break the gasoline into a fine spray. The device is connected to the carburetor intake and the breaker. It is made for the Ford engine and retails at \$6. The maker is the Motor Essentials, Inc., 256 Main Street, Buffalo, N. Y.

## Hampshire Spark Plug

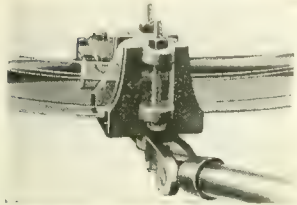
THE porcelain used in this plug is made of new material which is said to give unusually satisfactory results in service. The manufacturer is the Hampshire Mfg. Co., Hatfield, Mass.



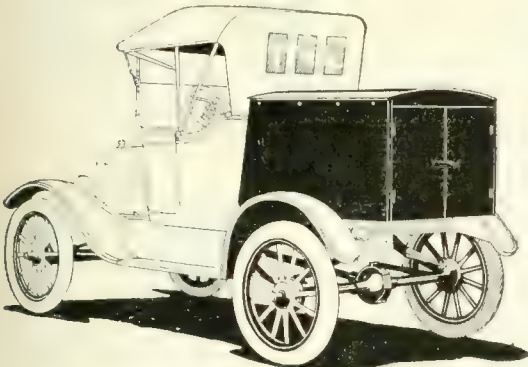
# Buyer's Department of The Commercial Vehicle



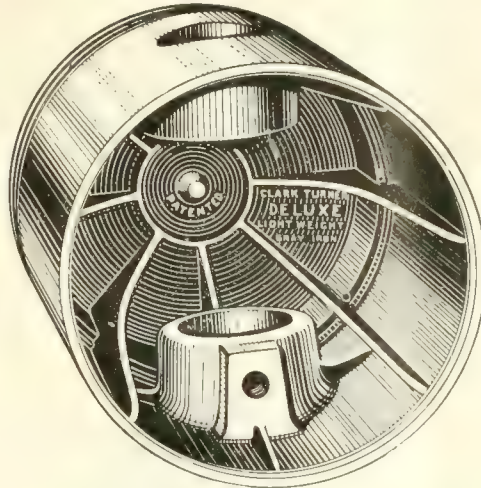
Millers Falls jack



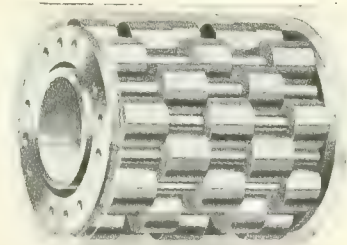
Kimkin Universal tow bar



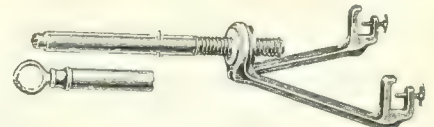
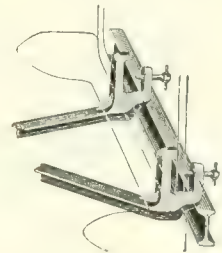
Slip-on Ford body



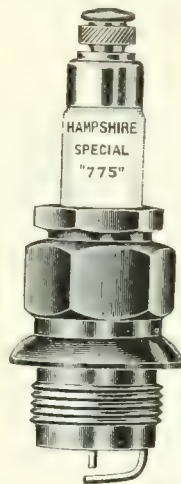
Deluxe piston



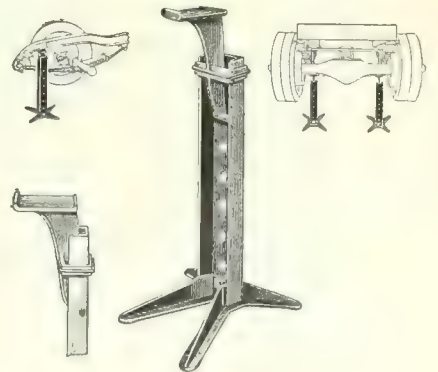
Hart roller bearing



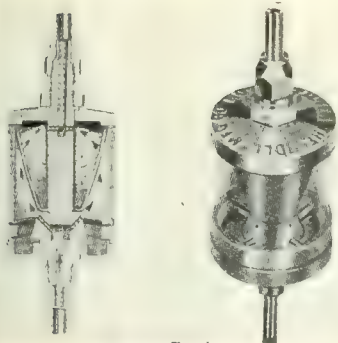
Simplicity towing pole



Hampshire special spark plug



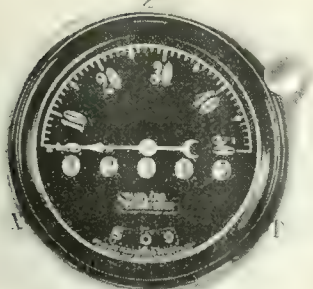
Simplicity steel horses



Ro-Gas-Filter



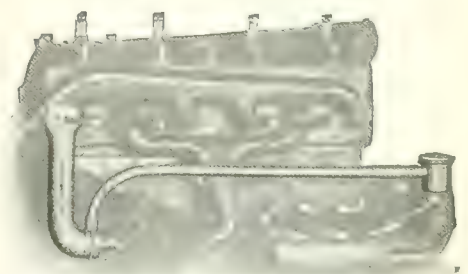
Benford Ford timer



Ford speedometer



Rose piston ring



Vacuum oil and gas saver



# Buyer's Department of The Commercial Vehicle

## Manley Utility Crane

**T**HIS crane is adapted for all lifting work inside the garage as a portable floor crane and for all outside wrecking, towing and lifting. Due to a four-unit construction, two men can take it down and put it together again in 5 min. It can instantly be changed into a wrecking crane mounted on a service truck or vice-versa. When used as a wrecking crane, there is an overhang of the beam of 42 in. This requires a space of 36 by 24 in. The lifting capacity is 2 tons. The weight is 400 lb.

In its complete form with a portable base it has an overhang of 36 in., a high lift of 7 ft., and a lifting capacity of 1½ tons. It is constructed of steel throughout, except the gearing which is cast iron and the base which is seasoned white oak. The portable crane costs \$137.50 and the wrecking crane \$124.30.

The maker is the Manley Mfg. Co., York, Pa.

## Goodell-Pratt Bearing Scrapers

**T**HESE scrapers are forged from a high grade of tool steel, so hardened and tempered that they will scratch glass. The especially designed cutting edges eliminate chattering, and their extreme hardness assures a smooth, easy cut. Four sizes are supplied with cutting edges ranging from 1½ in. to 4½. Prices range from 75 cents to \$1.00, according to size. The maker is the Goodell-Pratt Co., Greenfield, Mass.

## Self-Adjusting Gear Puller

**T**HIS tool is instantly adjustable without changing any pins or set screws and one of its features is that the harder you pull, the tighter it grips the gear being pulled. The pulling arms are made of a specially prepared steel that is claimed to withstand the hard use the average gear puller is subjected to, and a special heat treatment adds to their tensile strength. The screw is claimed not to twist or strip the threads. It is made in three sizes, Nos. 10, 20 and 30. The first will take gears up to 6 in. in diameter, the second up to 9 in. and the third up to 18 in. The No. 30 can also be used for pulling any size wheel. The maker is the George L. Hunt Mfg. Co., Inc., Boscobel, Wis.

## F-J Piston Reamer

**T**HE outstanding feature of this reamer is the ease with which it can be adjusted to any size within its range by simply turning the knurled head screw at the shank end of the reamer. The blades which move parallel can be expanded or contracted in the same manner as a micrometer is adjusted. The reamer is contracted to a size slightly smaller than the hole, inserted in same and expanded gradually as

## Shop Equipment

the hole is being reamed. By means of graduations on the knurled screw the amount of expansion can be read off very accurately. With this new method it is easy to ream a hole to fit a shaft or pin. The hole can be made undersize, standard or oversize, as happens to be required. The maker is the Foster-Johnson Reamer Co., Elkhart, Ind.

## Little Giant Split Rim Tool

**T**HIS tool is designed to do the most difficult tasks in expanding and contracting all kinds and sizes of split rims. The stand is built of steel angles with reinforcements. A 1-in. spindle with a square thread is provided. The gripping parts made of malleable iron. The height from the floor is 36 in. The tracks or slides in which the arms travel prevent the tool from buckling or the arms from sliding. The distance between gripping points are equal at all times. This prevents damaged or sprung rims. The price is \$30 and the maker is the Marquette Mfg. Co., St. Paul, Minn.

## Rysco Boring Machine

**T**HIS device bores the three Ford crankshaft bearings on the cylinder block in line and parallel with the camshaft. The alignment bracket adjusts the bar to the proper distance from the center of the crankshaft bearing to the center of the camshaft bearing.

This machine is bolted to the cylinder block bearings, the bearings of the machine being spaced and drilled standard to fit in place of the crankshaft bearing caps. Other features include an automatic feed and quick return of the tool; all gears enclosed and run in grease; cutting tools spaced to have constant cutting; no jerks or hard pulling; cutters adjustable to permit boring for turned crankshafts. The price is \$100 and the maker is the Railway Specialty Co., Atchison, Kansas.

## Hyrate Battery Analyzer

**T**HIS is a combination battery testing instrument. It may be used for testing the battery under heavy discharge, for taking an open circuit reading or for cadmium testing. This is accomplished by the addition of a third terminal, from which a calibrated resistance leads to the instrument itself. Attached to the third terminal of the meter by means of a flexible lead is a forked spike which is used for the voltage and cadmium tests. The maker is the Service Station Supply Co., 30 East Larned Street, Detroit.

## Valve Keeper Insertor

**T**HIS tool, manufactured by the Service Equipment Co., Kansas City, Mo., is claimed to greatly simplify the work of valve grinding by making it possible to remove and replace the valve keepers or keys in a few minutes in place of several hours. It is adjustable to the various sizes and shapes of keepers through jaws that open and close by the simple action of pulling or pushing with the thumb on a knob on the tool handle. In addition to gripping the keeper by these jaws the tool supports it by a frame under the jaws.

The tool is said to retain its firm grip on the keeper until the valve spring has been replaced and the cup supporting the spring is fully down and in place on the keeper. The drop of the cup on the keeper releases the tool and it is then withdrawn. The pin and flat key keepers when gripped are centered in the tool and since the slot in the end of the frame supporting the jaws fits the stem diameter, the pin is centered to the hole and placed exactly for quick insertion.

## Duo Convertible Creeper

**A**LL the features of a creeper are combined with a portable work seat in the Duo convertible creeper. When being used as a creeper the seat folds down and forms part of the frame. A leather upholstered head support adds to the comfort of the user. The outside frame dimension is 36 by 5 in. The price is \$12.50 and the maker is the Walker & Barkman Mfg. Co., Hartford, Conn.

## Aligning Reamer

**C**HADWICK & TREFETHEN, Portsmouth, N. H., have brought out a new type of aligning reamer following closely the lines of their Critchley-Six reamer. The new type has an additional pilot that precedes and guides the reamer. It also has the back part of the blades ground cylindrical, which guides the reamer both before and after passing through the holes to be aligned. This reamer is made in thirteen sizes covering all the requirements for the various piston pins on the market.

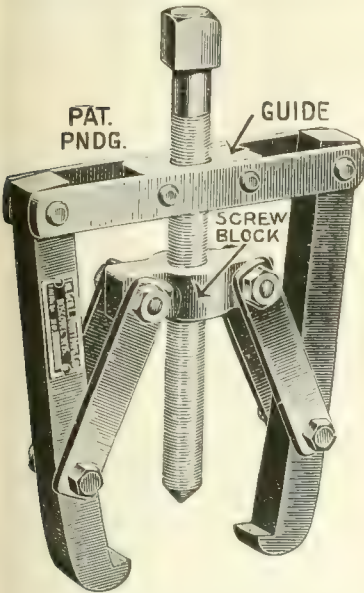
## Brake Lining and Clutch Facing Data Book

**T**HE General Asbestos and Rubber Co., Charleston, S. C., has just issued its Garco data book with tables showing the type of brake and clutch used on practically every American make of truck and motor car together with the size and number of segments of brake lining and size and number of clutch facings they require. This book also gives complete information on the relining of brakes, removing the brake bands, etc.

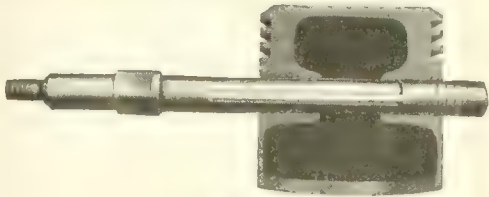


# Buyer's Department of The Commercial Vehicle

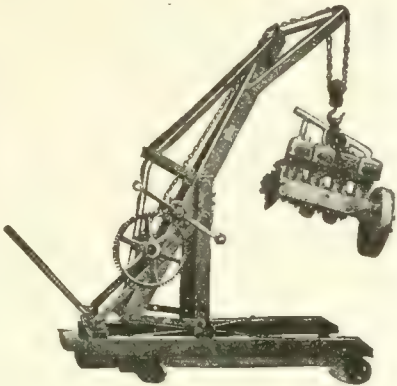
Keep Your Shop Equip-  
ment Up to Date.



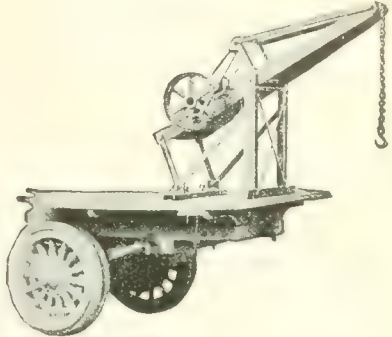
Self-adjusting gear puller



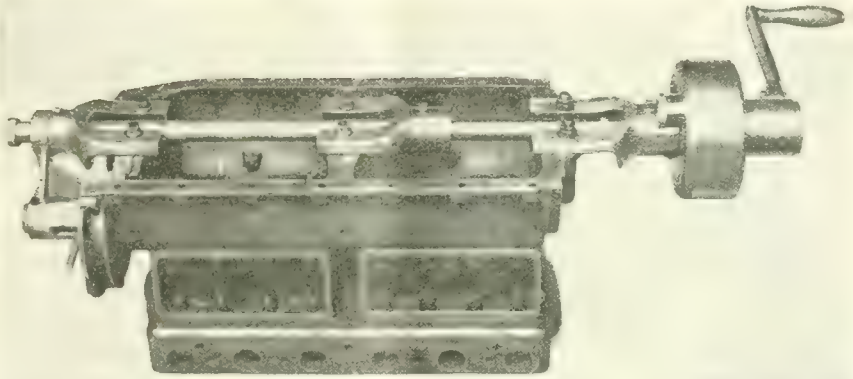
F-J piston reamer



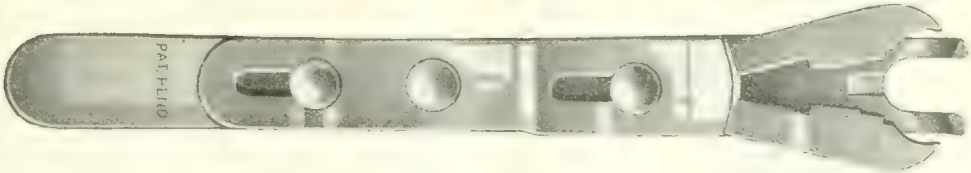
Manley utility crane



Goodell-Pratt  
bearing  
scraper



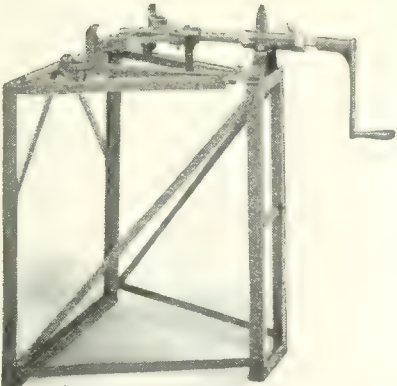
Rysco boring machine



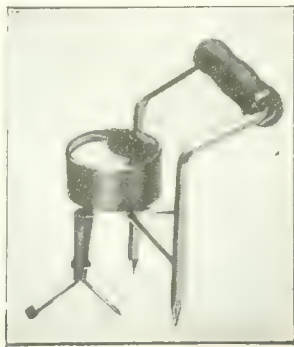
Valve keeper inserter



Duo-con-  
vertible  
creeper



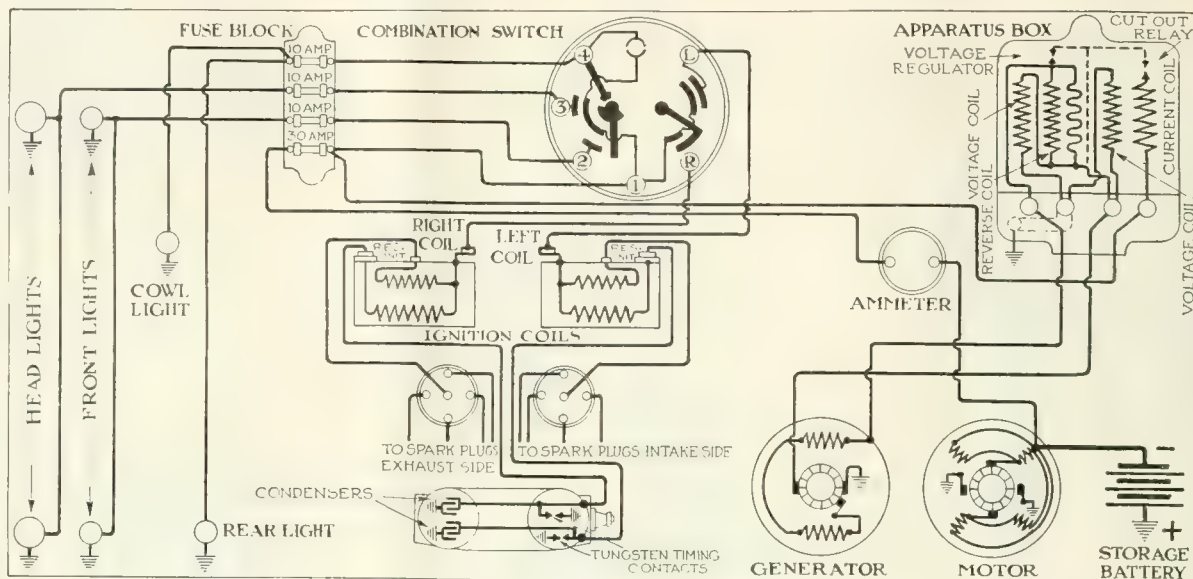
Little Giant split rim tool



Hyrate battery analyzer

# Motor Truck Electric System Wiring Diagrams

## 24—Starting and Lighting Unit on Pierce-Arrow Trucks



Delco circuit diagram illustrating the starting and lighting system as used on the 1921 Pierce-Arrow truck models X-5, W-2 and R-10. These trucks use two sets of spark plugs

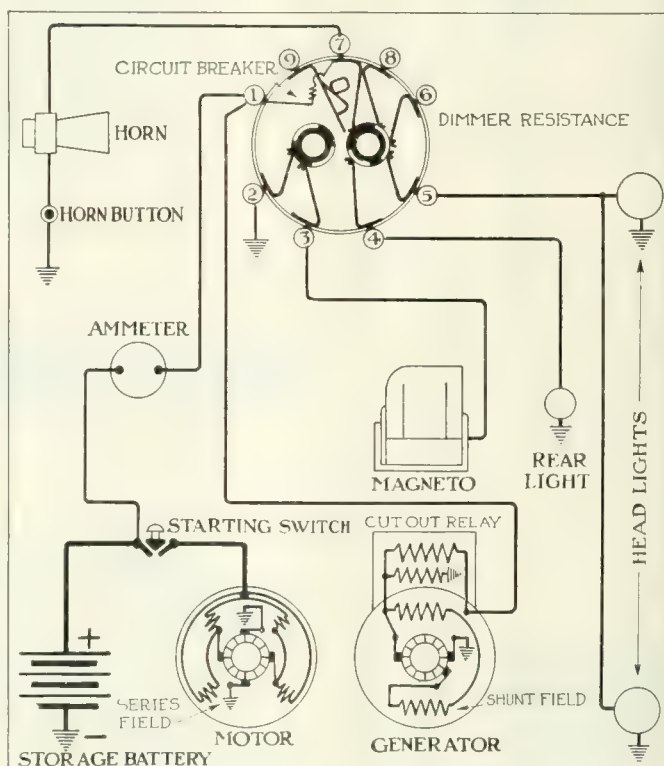
### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE.

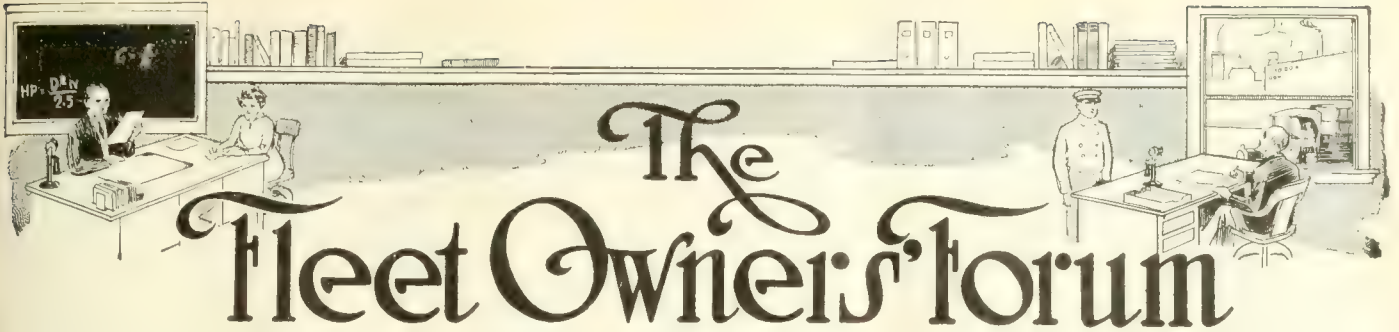
1920	
1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting.....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15
1921	
12—Maxwell, Lighting.....	Jan. 15
13—International, Starting and Lighting.....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 15
17—Reo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Apr. 15
19—Stewart, Starting and Lighting.....	May 1
20—Kelly-Springfield, Starting and Lighting.....	May 15
21—Riker, Starting and Lighting.....	May 15
22—U. S., Starting and Lighting.....	June 1
23—Wilcox, Lighting.....	June 1
24—Pierce-Arrow, Starting and Lighting.....	June 15
25—Republic, Starting and Lighting.....	June 15
26—Parker, Starting and Lighting.....	Next Issue
27—Noble, Starting and Lighting.....	Next Issue

## 25—Starting and Lighting Unit on Republic Truck



Wiring diagram of the starting and lighting system as used on the 1922 Model 10 Republic Express, using a 4-N Continental engine. The electric system is of Delco design





# The Fleet Owners' Forum

## Operating Costs of Horses as Compared with Trucks

To the Editor COMMERCIAL VEHICLE:

We have run into one of the 6-yr. old arguments on our relative operating costs of horses as compared with trucks. The case under consideration is a large department store which is using single horse rigs for delivery as well as for hauling the farm produce for its grocery and meat departments.

If you have any recent information available as to present cost of horse-drawn vehicles we should be glad to secure such information covering particularly space required for stabling horses and storing of the vehicles, the interest on investment, the depreciation on horses, the extra equipment needed for emergencies and the daily maintenance costs.—READER.

We refer you to the April 1, 1921, issue of THE COMMERCIAL VEHICLE, pages 144 and 145. The title of the story is "A 1-Ton Truck Replaces Four Horse-Wagons—and Saves \$5,500 Per Year."

We might also refer you to another story which is pertinent to the subject of horse-drawn vehicle costs. This story appeared in the March 15 issue on pages 112 and 113 and is entitled "Is This Your Problem?"

Judging from the report received from Walter C. Rathbun of the Rathbun Cartage Co., Toledo, Ohio, single horse wagons cost per day in the neighborhood of \$10.50 and a team of horses cost around \$14.50. His full report is shown on page 329 of this issue.

## Checking Alignment and Twist of Connecting Rods

To the Editor COMMERCIAL VEHICLE:

In the May 15th issue of THE COMMERCIAL VEHICLE, a photo appeared illustrating the methods used to check alignment and twist of connecting rods by the makers of the Mack truck. It appears to me, that the explanatory note under each illustration should be interchanged, or that the explanations have been transposed.

I have used these identical methods myself on repair work for years. And their application is very well known among machinists.

In the left hand illustration, should the pointer on the surface gage just touch both ends of the wrist pin, it would indicate absence of twist, or that the bore of the wristpin and crankpin holes were in the same plane, assuming, of course, that both ends of the

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

crankpin arbor as shown, had first been set an equal distance from the surface plate by a surface gage or height gage.

In the right hand illustration is shown a connecting rod in a vertical position supported on two V-blocks. In this case, should the pointer on the surface gage just touch both ends of the dummy piston pin or arbor, it would indicate that the bore of both crankpin and piston pin holes are parallel or that the center line of both bores is an equal distance apart at all points, the square being held against the side of the crankpin bore on its face with its base resting on the surface plate, and a measurement then taken from the upper outside edge of the square.

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

The side face of the piston pin hole should equal a like measurement on setting the square on the opposite side of the connecting rod and repeating the same operation.

This method is an approximate check to the alignment of both yoke ends, as the side face of the piston pin yoke ends is not generally finished and consequently not a perfect test. This will answer all practical purposes, however.—HARRY MORRIS, Department of Water Supply, Gas and Electricity, Borough of Bronx, New York City.

## Wants Advice on Welding of Broken Springs with Forge

To the Editor COMMERCIAL VEHICLE:

Just how to proceed in every detail to weld broken truck springs in an ordinary forge would be of great interest to me. I would like to know the following:

1. How to form to make the weld.

2. Any names of compounds to use on weld.

3. How to get right heat to make weld and know how not to overheat and burn.

4. Any information on kind of fuel or how to get best fire.

5. Information on tempering.

6. Can springs be welded by an oxygen welding outfit?—R. A. LIVEZEY, Pedro, W. Va.

Many of the questions contained in your inquiry can be best obtained from hand books, such as the following:

"Oxy-Acetylene Torch Practice" by J. F. Springer, published by the Richardson Press, 156 Leonard Street, New York.

"Oxy-Acetylene Welding and Cutting" by H. P. Manly, published by Frederick J. Drake & Co., Chicago.

"Autogenous Welding and Cutting" by Theodore Kautny, published by the McGraw-Hill Book Co., New York City.

"Automobile Welding with the Oxy-Acetylene Flame" by M. K. Dunham, published by the Norman W. Henley Publishing Co., New York City.

In regard to question 5, this is an art which takes considerable study and practice, involving different metals, different heats and different uses, and in order to even get an elementary knowledge of it, it would be necessary for you to take shop practice with one who is thoroughly versed in the matter.

We do not advise you to resort to oxy-acetylene welding, owing to the action of the springs under working conditions.

## Burning in Ford Bearings Calls for Experience and Skill

To the Editor COMMERCIAL VEHICLE:

I would like to know which is the proper way to burn in Ford bearings, dry or with oil when they are in the burning-in stand?—H. WHEELER, Mt. Vernon, N. Y.

Bearings burned in at the Ford factory are burned in at high speed and dry. Burning in a set of bearings requires some skill and without considerable experience many jobs may be lost. Bearing caps should be so that they have about ¼ in. rock and then bolted down as tight as possible without the use of pins. If a slow speed outfit is used it will require about 5 min. to burn the set in. Care should be taken to see that the temperature remains a little below the melting point of the babbitt. After about 3 min. of operation, a little oil may be poured over the bearings. After assembling the engine, it should be run in with oil for about 2 hrs. before it is allowed to run under its own power.



## Shop Equipment and Its Rate of Depreciation

To the Editor, COMMERCIAL VEHICLE:

I would like to get your opinion on the subject of shop equipment depreciation. This is an important item that should be figured in as a part of the cost of maintaining a fleet of trucks. I do not know just what rate of depreciation fleet owners in general allow for, but it seems to me that it should average at least 10 per cent. I would certainly appreciate reading what some of the COMMERCIAL VEHICLE readers are doing on the subject.—A. SPRYER, New York City.

You have started a very interesting discussion and one that may well prove of value to fleet owners because of the fact that it is often disregarded, we have found through investigation. Judging from the opinions of some of the readers of THE COMMERCIAL VEHICLE, your estimate of 10 per cent is generally approved.

We are giving you below, the opinions of some of the largest fleet owners on the subject of shop equipment depreciation.

Adam Horr, garage superintendent of Adolf Gobel, Inc., states, "—in our estimation 10 per cent would be a fair charge for depreciation on shop equipment.

"Some of the heavier units such as lathes, drill presses, etc., if given ordinary care will be in good condition after 10 yrs. use. Motor stands, vises, arbor presses, etc., often last much longer. Smaller hand tools do not last quite as long as the large tools, but by taking the life of all tools as a general average, we figure that 10 per cent would be the proper charge."

W. F. Banks, secretary and treasurer of the Motor Haulage Co., states, "—we are unable to make any definite statements as to depreciation rates for many reasons.

"Shop equipment, when the shop is of any size, usually consists of two classes of equipment, machinery, which includes lathes, drill presses, milling machines, etc., and small tools, or equipment which cannot be charged directly to operating expenses but yet depreciates much more rapidly than the machinery. Another feature which has to do largely with depreciation of machinery is of course the care which is taken in maintaining the machinery, and also whether or not the machinery was new when installed, and if new, whether or not the latest type, in other words the factor of obsolescence must be considered.

"The usual rate of depreciation for machinery is not more than 6 or 8 per cent, while with other small tools runs from 10 to 15 per cent. These rates, however, seem to apply more to manufacturing clients than to the ordinary small shop.

"Assuming that the worse features exist and also that a large portion of the shop equipment is in the small tool class, a depreciation rate of 15 per cent would not be too high in the majority of instances."

N. J. Smith, superintendent of gar-

ages of the Consumers Co., Chicago, states that his company charges depreciation of 10 per cent on all shop equipment and that from past experience for a number of years, the results of this rate have been very satisfactory.

The Clearing House Parcel Delivery Co., Boston, and the Shults Bread Co., Brooklyn, N. Y., charge off 10 per cent. The Peter Doelger Co., New York City, charges off 10 per cent.

The Machine Tool Section of the Sales Bureau of the War Department has prepared a chart which helps in revaluing used machine tools. This chart is illustrated herewith.

## History of Store-Door Delivery in Terminal Service

To the Editor, COMMERCIAL VEHICLE:

I have noted of late that there has been much agitation for the installation

## Shop Equipment Depreciation

Overhead costs consisting of power and light, clerical work, shop equipment depreciation, etc., are very often overlooked in figuring out the cost of operating a fleet of trucks.

Shop equipment depreciates at least 10 per cent a year, according to some of the most progressive fleet owners.

## What Are Your Views?

of store-door delivery by the railroads. Is this a new idea and if not when was it tried out before? What is the general plan?—READER.

While the store-door collection and delivery of freight shipments by instru-

mentalities, either directly or indirectly connected with the carriers, has long been an established English custom and later a development of Canadian railway practice, this form of service has never been inaugurated generally by the American railways. It was, however, placed in operation in Baltimore in 1867 by the Philadelphia, Baltimore and Washington Railroad, and when that road became a part of the Pennsylvania Railroad system in 1881, the store-door collection and delivery service was continued. The Baltimore & Ohio Railroad did not meet the Pennsylvania Railroad in this respect until 1886, when its Philadelphia and New York extensions were completed, but in that year the service was established in Baltimore and Washington, simultaneously, by the Baltimore & Ohio Railroad. The Pennsylvania Railroad had already extended the service to Washington previously, in 1883.

Delivery limits or zones were created in both cities extending to cover practically the city limits and arrangements were made for cartage. In Baltimore, the Pennsylvania Railroad operated through the Baltimore Transfer Co., while the Baltimore & Ohio Railroad Co. organized the Blue Line Transfer Co., which from the beginning was owned and controlled by that company.

In Washington, the Pennsylvania Railroad contracted with the Knox Transfer Co., later the Merchants Transfer Co., while the Blue Line Transfer Co. served the Baltimore & Ohio Railroad, as in Baltimore.

This store-door delivery plan, as it was known, remained in effect and daily operation for a period of 44 yrs. before any question of any movement was raised in regard to any of its phases, but on Sept. 19, 1911, C. E. Cassassa, an Italian fruit and confectionery mer-

Chart for Use in Appraisal of Standard Machine Tools to Determine Service Value

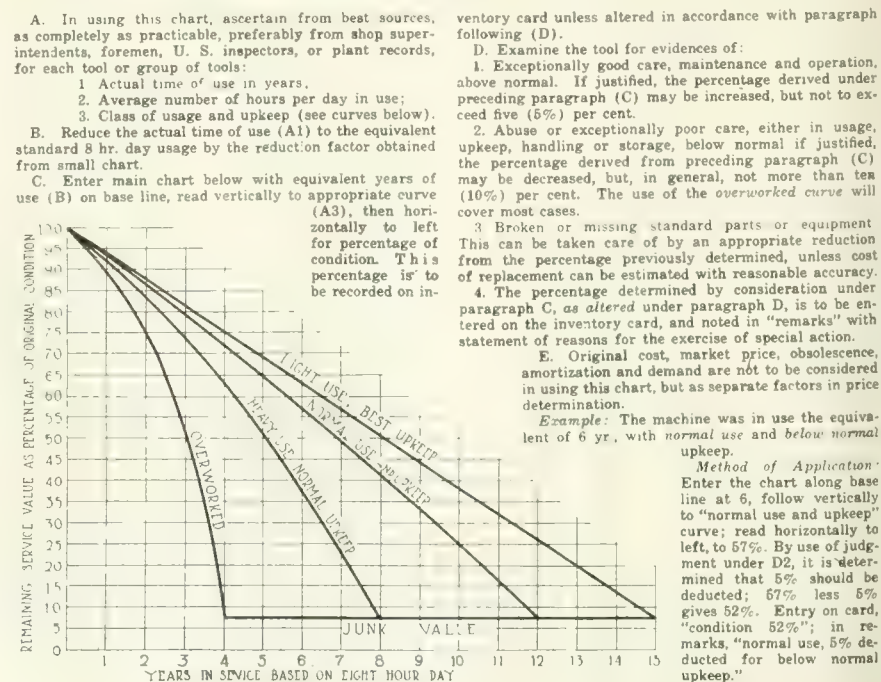


Chart used for determining service value of shop equipment



We would call your attention to the article by W. J. L. Banham, general traffic manager of the Otis Elevator Co., which you will find on pages 304 and 305 of this issue.

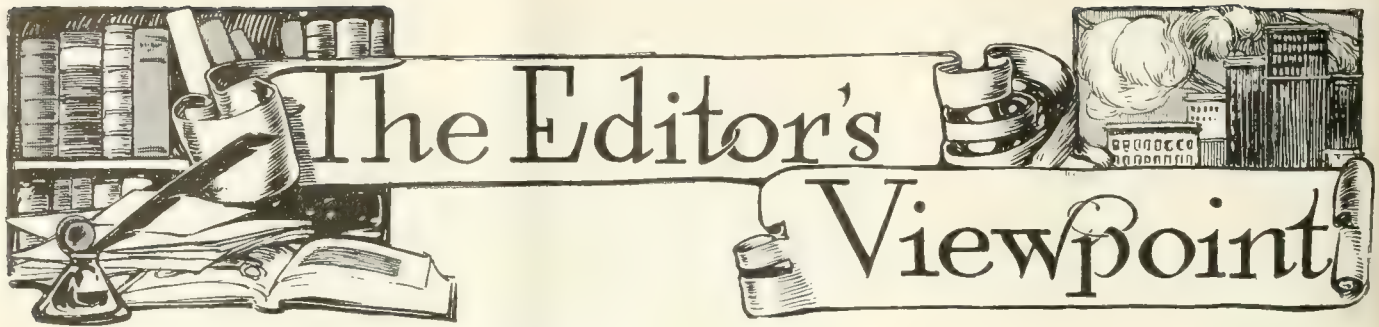
## INDEX SUBJECT TO LABOR AND MARKET CONDITIONS

(Continued from page 305)

The further development of the rural motor express would tend to diminish the now high cost of food products.

This exposition of the possibilities and importance of store door delivery should bring home to all fleet owners and superintendents the boon which this system may prove to them. Under these circumstances let us all follow the development of the scheme as closely as possible and try to inaugurate it in our own community, wherever the volume of local business is sufficient to justify it.





## A Little Warning About Costs

**O**WNERS of trucks must keep costs on those trucks. If the trucks are a secondary consideration, that is, if trucking itself is not the main part of the company's business, cost records must still be kept because of their value in stopping leaks through faults in the system, because of their value in preventing theft and wilful or inordinate damage and for book-keeping purposes.

But there is another angle on cost keeping which is equally important in many instances.

Practically every day, some business man is coming to the momentous decision to install one or two trucks or a fleet of trucks, to take care of deliveries or haulage previously handled by horses or by some outside hauling concern. And practically every day, some business man comes to the decision that his present fleet equipment is not the best possible equipment, from a standpoint of either tonnage capacity, body equipment, loading equipment, final drive or type of power plant (whether electric, gasoline or steam).

On what do these business men base this decision?

Very often such a decision is based on the amazing performance of some other fleet owner who has installed some special equipment.

Perhaps the business man hears of this performance through a dealer or a factory representative. He is furnished with the detailed cost figures showing how the special equipment in question has reduced costs per mile or per ton-mile very greatly or even split them in half.

Or perhaps the business man sees a statement in a house organ or in a magazine, in the words of the lucky fleet owner himself, telling how a certain truck or a certain type of equipment has reduced his costs to a minimum and increased their earning powers to an amazing extent.

Some such reports are accurate. In some instances special types of trucks or equipment have actually brought about the savings claimed for them.

In such cases the business man may well go and do likewise.

But in many instances these reports are not accurate. And in many other instances they are

highly misleading and therefore quite dangerous.

Neither the dealer nor the manufacturer is to blame as a rule. They have accepted the statements and printed them in good faith. They have faith in their product and they are always ready to believe a disinterested claim made for it.

But the trouble is that such statements are not always disinterested.

In certain cases, persons having no actual interest in the trucking world, will collect this material in a most haphazard manner.

Perhaps they catch the fleet owner on his way to an important meeting, drag him to one side and abstract a few figures from him off-hand on the cost of running his trucks. The fleet owner does not know exactly what it is all about and he wants to get away anyway. So perhaps he gives a few figures off-hand as well as he can remember them. But naturally he does not minimize the excellence of his system.

Then the collector of this very questionable material goes away and squeezes his figures into a cost keeping system, adds a few touches of local color and sells them for publication.

The inquiring business man reads the figures and takes them for gospel truth, tries the equipment himself and then promptly loses all faith in dealers and truck manufacturers.

For the figures were inaccurate, or they were incomplete, or both. Therefore, you can depend upon your own cost figures, but it is not always wise to depend upon anyone else's, even when they are published in a manufacturer's house organ. It is better to analyze them very carefully to be sure that nothing is omitted. And even then, it is better to get in touch with the fleet owner with whom the cost figures originated, to be sure that the figures as stated are really actual statements of facts—and all the facts.

For the collector of the original figures probably did not worry nearly so much about accuracy as about the sale of his story. And in more than one instance, cost figures collected and published in this way have not only been incomplete but have been actually inaccurate in the first place.



## Ace Truck Maker to Sell Direct

### Drops Dealers in New Sales Plan—Price Reductions of \$455 to \$655

NEW YORK CITY, June 10—"That the only immediate way to substantially reduce truck prices is to reduce sales costs" is the basis of a new direct-from-factory-to-user plan just announced by the American Motor Truck Co., maker of the Ace trucks, Newark, Ohio. Under this new selling policy zone offices will be established gradually. Coincident with the change of policy, the company has announced a reduction of \$455, or 16½ per cent on the 1½-ton model and of \$655, or 23½ per cent on the 2½-ton model. The new prices are \$2,295 on the 1½-ton and \$2,795 on the 2½-ton models.

Under the new Ace sales policy, distributors and dealers are entirely eliminated. Retail sales are handled direct from the factory and all service comes under factory supervision.

A foundation for the direct-selling plan is a division of the country into small districts or zones, several zones being blocked off in each state. Each zone will be placed in charge of a factory zone manager who will have direct supervision of all sales and service in his zone. A passenger car is provided each zone manager to facilitate quickly reaching all points in his zone, and authorized Ace service stations will be established in each town in each zone. When the plan is fully developed it is purposed to have a service station at every place where there is a garage or repair shop.

It is planned in each territory to have a central parts depot or two or three if necessary, and 200 or more service stations handling monthly inspections of all Ace trucks in the territory and doing necessary repair work.

A comprehensive system of obtaining names of truck prospects is the nucleus of the new sales plan. An arrangement has been worked out whereby any person reporting the name of a truck prospect to the service station or zone manager receives a check from the factory for \$50 in case the sale is made. Regardless of whether the service station or the zone manager makes the sale, so long as the prospect emanated from the service station, the service station receives a commission of \$100 when the sale is completed, and the person who furnished the name of the prospect receives \$50. If the service station discovered the prospect first the entire commission of \$150 is paid the service station. In case of several stations furnishing the name of the same prospect, the commission is paid the service station or informant filing the prospect first.

In addition to the commissions paid service stations, the factory pays the service station \$45 for rendering an inspection service for 1 year to the truck buyer. This service covers four inspec-

tions of 3 hours each during the first month after a truck is delivered, and one service of 3 hours each month thereafter for the ensuing 11 months. A coupon book is furnished with each truck sold, these coupons being good at any authorized Ace service station. Each coupon calls for 3 hours of labor and is redeemed by the factory at \$3 when countersigned by the truck owner acknowledging receipt of this service.

This new sales plan was originated by C. L. Bowler, general manager of the company. It will now be developed on a national scale under the direction of G. B. Hiller, who assumed the position of general sales manager May 1.

### Favor Interchangeable Truck Wheels and Bodies

WEST BADEN, IND., June 2—Results of the current semi-annual meeting of the Society of Automotive Engineers should interest fleet owners. This society has adopted the report of the Motor Truck Committee for a standardization of motor truck hubs. The report lists five standard front hub assemblies for trucks, and specifies the flange and bolt circle diameter, size and number of bolts, wheelbase, hub bores, spindle diameters and bearing size and spacing. It is proposed later to submit a similar report on truck rear hubs.

The adoption of this report should immediately change the present practice of making each new truck job of different measurements and requiring a fleet owner or service station to keep a very large assortment of wheels in stock.

Another standardization should appeal to fleet owners. That was the recommendations for motor truck bodies, which came before the entire Standards Committee for the first time and was adopted without dissent. It is believed that when these recommendations are carried into practice truck bodies will become interchangeable. The report includes dimensions for the stringers, bolsters, distance from the back of the seat to the center of the rear axle and the distance from the back of the seat to the rear end of the frame. These dimensions are suitable for the interchangeable mounting of truck bodies with the exception of special types such as large van bodies and special short dump bodies.

### New Kansas Truck Fees

TOPEKA, June 10—The new fees in this state covering trucks are based on the carrying capacity and provide for the following scale:

One ton or less	\$15.00
Over 1 ton and not over 1½ ton	22.50
Over 1½ ton and not over 2 ton	30.00
Over 2 ton and not over 2½ ton	37.50
Over 2½ ton and not over 3 ton	45.00
Over 3 ton and not over 4 ton	70.00
Over 4 ton and not over 5 ton	100.00
Over 5 ton, \$25 per ton additional.	

### Vim Under New Control

PHILADELPHIA, June 2—The Standard Steel Car Co., Pittsburgh, has taken over the Vim Motor Truck Co., Philadelphia and will operate it as one of its subsidiaries.

## Price Reductions in Truck Field

### Ford Makes Second Slash in Prices—Kissel and Dodge Follow Suit

NEW YORK CITY, June 7—Another cut in prices was announced today by the Ford Motor Co. They are effective immediately. The cuts range from \$15 on the stripped chassis to \$50 on the truck. The following table shows the changes:

	Old Price	New Price
Chassis	\$360	\$345
Roadster	395	370
Truck chassis	545	495

A drastic price cut has been made by Dodge Bros. to become effective immediately. The screen side express wagon which sold formerly for \$1,270 is now quoted at \$1,085. The panel delivery wagon, formerly priced at \$1,350, now sells for \$1,135.

The 1-ton Kissel truck chassis has been reduced in price from \$2,175 to \$1,585.

The Federal Motor Truck Co. recently sent out a letter guaranteeing prices on Federal trucks to October 1.

The Chevrolet Motor Co.'s truck prices are as follows:

Model	tons	
¾ chassis		\$ 820
¾ chassis with cab		895
1 chassis		1,225

The Bessemer Motor Truck Co., Grove City, Pa., has made reductions ranging from \$400 to nearly \$1,000. The reductions on the following models were made:

	New Price	Old Price
1-ton	\$1,395	\$1,700
1½-ton	1,995	2,445
2½-ton	2,595	3,285
4-ton	3,495	4,485

### Nash Brings Out New Truck

KENOSHA, June 9—The Nash Motors Co. has brought out a 2½-ton truck which is especially adapted to highway construction work. Its general specifications are much the same as the present 2-ton model, 3018, except that the springing has been made heavier, the wheelbase shorter and some other minor changes have been made to allow for the heavier loads. The price, f. o. b. factory, will be the same as the 3018, \$2,550.

### Wisconsin Speed Truck

MILWAUKEE, WIS., June 7—The Wisconsin Truck Co., Loganville, Wis., for 3 years engaged in manufacturing motor trucks suitable for general farm and light commercial trucking, has added a larger model, called the Wisconsin express truck. It is powered with a 6-cylinder Continental engine and has a capacity of 3 tons. The tire equipment is pneumatic.



## Trucks Handle Mine Output Direct

### Birmingham Companies Solve Coal Transportation Problem to Consumer

BIRMINGHAM, ALA., June 6—The motor truck has just been pressed into a new service, or at least a new one so far as the Birmingham coal district is concerned. This service consists of transporting coal direct from the mine to the dealer or consumer, a distance of 13 miles.

The County Coal Co. recently opened some new mines at Grant's Mill, in the Cahaba basin near Leeds, Ala. There was no railroad in that immediate vicinity to take the coal to market after it had been brought to the top, so the management faced a problem in transportation that seemed almost beyond solution.

The Central of Georgia railroad was willing to build a branch out to the property, but railroads are not built in a day, especially through the mountains in this section. Don Drennen, president of the Birmingham Motor Co., came to the assistance of the coal company and solved the problem with a fleet of Federal trucks.

These trucks are able to handle the present output of the mines pending further development of the coal properties and the arrival of the railway tracks. There are other virgin coal lands in this section owned by the DeBardleben and Alabama Fuel and Iron Company interests and it is possible that these concerns will inaugurate a similar service pending the construction of necessary spur tracks.

### Pintle Hooks Standard

NEW YORK CITY, June 8—At the annual meeting of the motor truck members of the National Automobile Chamber of Commerce, pintle hooks were adopted as standard equipment.

It was recommended that where such hooks are attached to motor truck or tractor frames they should be of the United States Government type. The hooks should be so mounted that the axis of the drawbar head shall be located both vertically and horizontally approximately in the center of the frame of the chassis. It is necessary therefore that means be provided for fastening one end of the safety chain to the rear end of the motor truck chassis frame; the clevis is to be located directly under the axis of the drawbar head, or as near to this position as possible.

The stand taken by the Trailer Manufacturing Assn. of America was that it was not necessary for the truck manufacturer to place a spring behind the drawbar head or pintle hook on the motor truck. In substantiation of this the association stated that trailers made by reputable manufacturers have a starting and stopping spring in the drawbar

or trailer head, which is of proper length and strength; any additional spring furnished by the truck manufacturer would therefore give too much spring action and cause the trailers to bump the truck. In the interests of better protection of the truck frame and driving mechanism truck manufacturers, however, are urged to equip their drawbar heads with springs according to the recommendation adopted by the National Chamber.

### Factory-to-Consumer Plan Disapproved

DETROIT, June 13—Voicing unqualified disapproval of the factory-to-consumer plan of selling motor trucks, directors of the National Association of Motor Truck Sales Managers, meeting here, adopted resolutions pledging aid and co-operation for dealers and efforts to discourage development of the direct sale plan. The attitude of the directors was unanimous, according to Don F. Whittaker, executive secretary of the association. Adoption of the resolutions came after the resignation of W. K. Ackerman as director and the Lewis-Hall Motors Corp. as a member. Ackerman is general manager of the company.

Fred Glover, general manager of the Timken Detroit Axle Co., G. W. Yeoman, vice-president of the Continental Motors and others were invited to address the meeting and presented their views. Following the lengthy discussion, the resignation of Ackerman and the election of J. F. Bowman, sales manager of Garford, to succeed him, the resolutions were adopted. It provides that "Whereas certain procedure has promoted the best interests of manufacturers and certain sales policies have shown tangible and definite results, the association will not indorse or approve any sales and service plan which will take from motor truck dealers profits to which they are entitled, realizing that such methods ultimately will be to the detriment of the consumer in that they will seriously affect proper servicing."

The resolutions further declare that the association will aid and support dealers in efforts to give prompt and efficient service, possible only through direct contact between dealer and consumer, and will discourage the factory-to-consumer method of merchandising trucks in the belief that the plan is impractical in that satisfactory service cannot be rendered without resulting in injury to the industry and great detriment to the consumer.

### Coming Events

1921

June 13-16, Detroit, Mich., Annual Convention of National Team and Motor Truck Owners, Inc., held aboard ship during cruise on Steamship Naronic.

June 30-July 1, 2, Milwaukee, Convention National Association of Commercial Haulers.

Sept. 28-30, New York City, Electrical Show, 71st Regiment Armory.

Sept. 2 weeks, Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.

## May Use Truck Instead of Railroad

### Rail Rate Raised 100 Per Cent to New Jersey Farmers—Second Increase

BEVERLY, N. J., June 2—Farmers in Burlington County have been notified by the Pennsylvania Railroad of a 100 per cent increase in tariff on their special daily fast freight into the New York markets. The farmers say this makes the cost of this transportation prohibitive.

Farmers today, in the midst of harvesting their pea crop, declared they would at once turn to motor truck transportation. Arrangements were made this morning to ship 25,000 packages of farm products during the next week by motor truck into New York, Brooklyn, and Newark.

Beverly is in the heart of the rich truck-growing section of Burlington County and the farmers, through their association, shipped more than 1,000 carloads of products by special train into New York markets last year. They estimated today that at least two-thirds of this would be diverted to motor trucks this summer unless the railroads made a lower rate.

The 100 per cent increase in the cost of this special train comes on top of the 40 per cent increase over freight rates paid at the beginning of last summer. To obtain this special train the farmers paid the regular freight rate plus an extra tariff. This tariff last year cost them \$102 extra a day and they arranged for the service at the same rate this year. Then the Pennsylvania Railroad notified the farmers that the special charge would be increased to \$205 daily this year. The railroad company said it had overlooked in its first estimate general order No. 11,241 of the Interstate Commerce Commission issued January 5 of this year, which raised the mileage charge for all special freight trains from \$1.25 to \$2.50.

### Cent Tax in Pennsylvania

HARRISBURG, June 2—Gov. Sproul has signed the "cent-a-gallon" gasoline tax. This law affects every sale of gasoline to a consumer in Philadelphia. More than \$2,000,000 a year will be realized in revenue by the measure's operation. The tax becomes effective on Sept. 1. It is estimated that Philadelphia, for instance, will receive \$350,000 a year as its share, as half the tax goes to the county.

### Husson Goes With Northway

BOSTON, June 10—Joseph Husson, who for the past 8 years has been editor of THE COMMERCIAL VEHICLE, has joined the Northway Motors Sales Co., in the capacity of general sales and advertising manager. The Northway company has just launched an active truck merchandising campaign in the territory covered by its thirteen factory branches.



# The COMMERCIAL VEHICLE

Read by Fleet Owners

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. O. Building  
239 West 39th Street, New York

## CONTENTS

Vol. XXIV, No. 11

July 1, 1921

### LEADING ARTICLES

Do You Believe the Motor Bus Will Ever "Come Through"? ..... 333

### MISCELLANEOUS ARTICLES

How Trucks Play Many Parts..... 338  
Cylinder Regrinding and Its Merits..... 340  
A Big Step in Transportation..... 344  
Look Around Now and Then..... 345  
Analyze Your Truck Costs..... 346

### DEPARTMENTS

The Better Way..... 348  
Buyer's Department:  
New ¾-ton Garford Truck..... 352  
1-Ton Stewart Speed Truck..... 353  
Truck Accessories..... 354  
Shop Equipment for Fleet Owners..... 356  
Motor Truck Electric System Wiring Diagrams... 358  
The Fleet Owners' Forum..... 359  
Editorial: A New Science..... 362

### NEWS

Pneumatics Lessen Road Wear ..... 363  
Ohio Governor Signs Weight Bill..... 363  
Goodyear Cuts Prices on Truck Tires..... 364  
Trackless Trolley for Detroit..... 364  
Index to Advertisers..... 84-85

## The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT

David Beecroft, Directing Editor  
Ray W. Sherman, Executive Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

Chicago, Mallery Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....\$2.00 per year  
Extra Postage west of the Mississippi River on account .....50c  
of Zone Postage Law .....\$3.00 per year  
Canada .....\$4.00 per year  
Foreign Countries .....\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

## WYMAN-GORDON

The CRANKSHAFT MAKERS

WORCESTER, MASS.

CHICAGO, ILL.

CLEVELAND, OHIO

## ESSENTIALS

MOTOR PERFORMANCE heads the list of essentials a manufacturer must consider and the CRANK-SHAFT makes or mars the operation of any motor.

THE SELECTION OF A WYMAN-GORDON CRANK-SHAFT not only guarantees the best results but is *prima facie* evidence that the manufacturer is satisfied with nothing but the best. OUR ENGINEERING DEPARTMENT is at your service in connection with any problems of crankshaft design.

OUR TWO LARGE PLANTS protect your deliveries as scheduled.

OUR THIRTY-EIGHT YEARS EXPERIENCE in the forging industry guarantees the quality of our product.

FORGE SHOPS AT

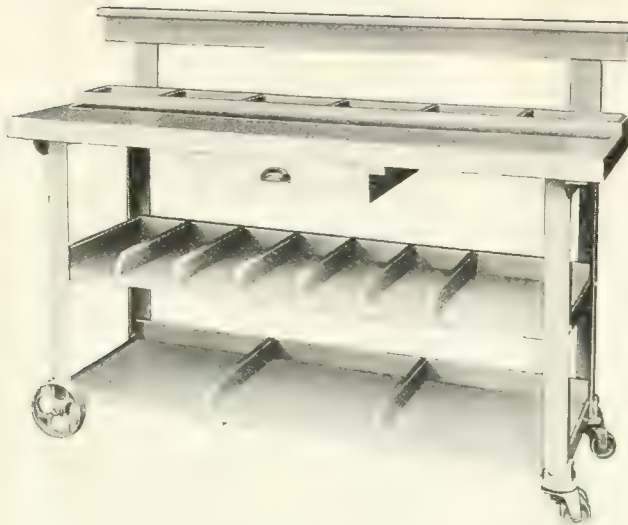
WORCESTER, MASS.

HARVEY, ILL.



# THE NEW CONTINENTAL WORK BENCH

THE LATEST ADDITION TO  
THE CONTINENTAL LINE OF  
SHOP EQUIPMENT



Only \$27.50

This is a labor-saving device that you will use more than anything else in your repair shop. A work bench for your mechanics that is a kitchen cabinet for their tools and parts—their filing system—AT A PRICE.

Here is a portable work bench that is big, strong and sturdy, that will pay for itself time and time again in your shop. Note the following specifications and you will immediately see why:

The Continental Work Bench is 60" long, 20" wide and 33" high. The top shelf contains sixteen holes for holding valves, springs and washers; the board underneath this shelf may be used for hanging tools. The top of the bench has a working surface 2" thick. Six bins are arranged at the rear of the table top for parts of distributors, carburetors, nuts, bolts, etc. Immediately in front of these bins is one compartment extending the full length of the table for tools. This middle shelf is made with six compartments for holding connecting rods, pistons and integral parts, and may be numbered to correspond with the cylinder of the motor. A larger compartment on the same shelf provides for manifolds, gears, etc. The lower shelf has three wide compartments on which may be placed large parts.

This big, husky bench is also equipped with a steel-bottomed drawer for tools and parts that need protection. Shipped knocked down, crated flat.

Model 30 Work Bench, code Garland.

Wire or mail your order today for one or more of these benches at this introductory price

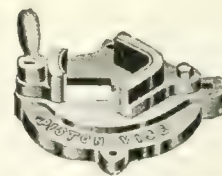
**Continental Auto Parts Co.**  
2305 E. 17th St., Columbus, Ind.

## The Continental Line

Motor Stand  
Ford Engine Stand  
Assembly Table  
Welding Table  
Battery Stand  
Radiator Stand  
Axle Stand  
Creeper  
Spindle Arm Bushing Press  
Crank and Cam Shaft Straightening Press  
Piston Vise  
Riveting Jig  
Piston Aligning Device  
Parts and Tool Tray  
Wrecking Truck  
Burning-in Machine  
Gear Pullers  
Universal Straightening Press  
Ford Assembly Table  
Portable Work Bench



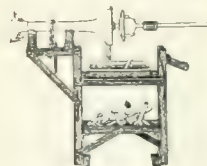
Motor Stand for all makes of motors.



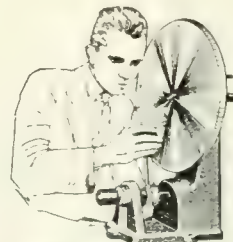
Piston Vise adjustable to 5"



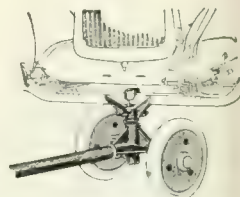
Ford Engine Stand handles complete power plant.



Axle Stands for every type.



Piston Aligning Device for testing connecting rod, piston and piston pin.



Wrecking Truck Supports, either front or rear axle.

# CONTINENTAL

*"The Efficiency Standard"*

# SHOP EQUIPMENT



# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXIV July 1, 1921 No. 11

## ***Do You Believe the Motor Bus Will Ever "Come Through"?***

**Will It Reach a Growth Sufficient to Enable Successful  
Competition with the Railroads, Interurban Trolley  
Lines, or Other Passenger Transportation Facilities?**

*Look  
at  
This  
Picture*



*And  
Look  
at  
This  
Road*

*First class equipment, ideal climatic conditions and equitable rates count for little in the motor bus field without good roads. Bus lines will remain in the embryonic stage just so long as they contend with poor road conditions. Good roads is an important question before the country. Read the story on the following pages and see what they have accomplished*

# California's Bus Leadership May Be Future Guide for All States

**Schedule Reliability an Important Factor—Territory Covered and Comfortable Riding Conditions Are Other Factors**

By F. H. Reed

DAVID Beecroft, directing editor of the Class Journal Co. publications, said in an article published on page 348, of THE COMMERCIAL VEHICLE, June 15, 1920, "California is developing bus service as is no other part of the country."

Whence comes the query, "How do motor bus conditions in California differ from those in other States?"

In answering this question I shall attempt to take the viewpoint of the prospective operator in another state. It is natural that such a person, impressed by the development of bus transportation in California, would wish to know how far it goes to indicate that success is due to conditions not existing at present elsewhere.

## Why "Jitney" Failed

Don't forget that California kicked in with the jitney bus back in 1914. Since then bus transportation, urban, inter-urban, rural and mountain country, has been the subject of unceasing experiment and continuous development in California. What the state has now, which is truly a comprehensive system and sub-

stantial service, is the survival of the fittest, to date. At this present day bus transportation in California runs into big figures, measured by dollars invested, fares earned, passengers carried, men employed, fuel burned, tires ground to destruction—any unit which happened to

---

**D**O California's motor bus conditions indicate a trend that will be followed eventually by the rest of the States?

The question is well worth considering as it may be a solution to transportation problems that are at present facing bus owners.

---

come nearest to the personal interest which determines a particular reader's special viewpoint on the industry.

The jitney bus craze arose and reached its peak in a condition of chaotic congestion of small, irresponsibly operated, overloaded light vehicles. This aroused

public disapproval sufficiently to enable street railway companies successfully to instigate passage of ordinances which put the jitneys out of business in the principal cities. At this time, there were just two outstanding examples of motor bus operation in the state. Curiously enough these were mountain lines operating only over roads which would apparently appeal more to a spirit of adventure than hard headed commercial enterprise. These were the stage lines carrying passengers to the summit of Mt. Wilson, and to the resorts in the San Bernardino mountains, respectively. These two pioneer lines were started with equipment of superior type, and are still operating. In fact, the San Bernardino line has so assisted in the development of resorts that it has provided itself with a very important traffic. It is the one conspicuous success among all the lines which have started on unpaved highways. Of course it enjoys the advantage of being supplementary to the railroads and has received a measure of cooperation from them in the form of connecting



*Typical scene in the newly opened country in California—a great valley of young orange plantings. These buses have been equipped with baggage carriers at the sides of the hoods*



**BAKERSFIELD**

**LOS ANGELES**

**SAN DIEGO**

**MEXICO**

**EL DORADO STAGE LINE**

**MOUNTAIN AUTO LINE**

**WHITE BUS LINE**

**WHITE STAGE LINE**

**RIM OF THE WORLD**

**PORTLAND, ORE. Tycha Traps Co.**

The progressive bus lines publish time tables, the passengers boarding the vehicles at terminals. The map on the right shows the territory covered by one of the lines

owns—and spread out the popula-

basic industries of California into the settlers enter as they spread

*The progressive bus lines publish time tables, the passengers boarding the vehicles at terminals. The map on the right shows the territory covered by one of the lines*

In the country east of the Mississippi Valley, good transportation is something the intelligent, progressive California residents appreciate and demand as an absolute essential. California has several classes of "boosters" who have united in forcing an unexampled campaign of road improvement. These are the real estate agents, extraordinarily numerous and aggressive, who want to be able to get people out quickly to distant acreage to sell it; the Auto Club, the great hotel and other interests, including merchants and automobile dealers, interested in opening up the state to tourists for their enjoyment and turning them into permanent residents; and the great, nationally known and famous cooperative growing and marketing associations, all of which are organized and recognize speedy and economical highway transportation as a vital factor in the successful operation of their industries.

## Trunk Highway System

After absorbing the preceding descriptive paragraph the reader will come to the correct conclusion that the development of good roads in California has come through unusually strong public demand and the natural exertions of numerous agencies, which are rather peculiar to the state. The bus operators have followed and have not had to do the propagandizing and pioneering to create a system of highways.

The topography of the state has been

line treatment, and has been in a favorable position to control its rates, as well as other operating conditions. Furthermore, the line carries freight and passengers.

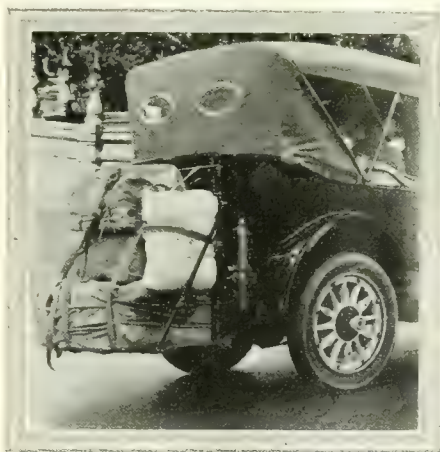
## Follow Paving

Having disposed by this brief mention of the important exceptions the investigator will find that elsewhere the bus lines have followed the paving. If you understand why California leads and for several years past has led in paved highways, you have one of the main reasons why it now leads in bus operation. Nature can claim first credit. Climate and scenery attract people to California. People who have made and saved money come out as tourists. Many of them on a first or subsequent visit to the state decide to stay in order to escape unfavorable conditions and enjoy those which they find superlatively agreeable. Naturally these are resourceful, energetic, up-to-date people. Some of them become permanent residents of the cities and engage either in speculation or mercantile or manufacturing business on a small scale. Other numerous typical settlers in California have located immediately with groups of old neighbors from their home state who have colonized the land. Others have played around the cities, taking trips, and then decided to stay, and gone out into the ranching districts. The basic industries of the state claim a large percentage of these settlers—people of mature years and judgment, proven superior business ability, and developed tastes for the conveniences, and frequently the pleasures of the social life incident to city residence. But these industries are located out on the vast lands of the state, or centered in the smaller cities

and towns—and spread out the population.

The basic industries of California into which the settlers enter as they spread out over the state are principally connected with the utilization of the marvelous natural resources of the Golden State.

Now if you will go back over the above



*Enjoyment of the open air and the scenery is not impeded for any of the occupants of the latest type California bus. The luggage carrier at the rear is an improvement over older forms*

and analyze it, you will realize how the conditions surrounding the people who use motor bus transportation and who supply it are basically somewhat different from those encountered in most other parts of the country. As distances between California towns and cities are on the average very much greater than



exceptionally favorable to the creation of a real trunk highway system such as no other state enjoys. The more closely settled and developed parts of California lie in great valleys, between the Coast Range and the Sierra mountains, or along the wide and fertile benches between the Coast Range and the sea. The highways and railroads run directly for hundreds of miles through the approximate middle of the chain of valleys, and population centers occur along these lines. Even the location of main laterals branching off the north and south trunk highways is commonly determined by the location of mountain passes.

Hence in California the development of paved trunk lines which actually are trunk lines was not beset with the innumerable divergences of local interests, both business and political, which have hampered progress in many states. Compare Wisconsin, which has had the trunk line idea but found it opposed by interests tending to create a network of equally but very moderately developed highways.

Climate and natural resources have played their part in aiding early and economical creation of a great system of paved highways. The state does not have to contend with snow or freezing, and from April to November there is even no rain; absolutely none whatever, as a rule from June to September, in most of the valleys. Crops are watered by irrigation from waters stored naturally in the mountains, with its flow artificially conserved and controlled.

### Road Materials Nearby

Materials for concrete construction occur locally in California, fairly well distributed, and an excellent grade of asphalt for surfacing is obtained from California crude petroleum. Due to the natural resources and conditions detailed above, California has led the nation in the building of fine highways—and the bus lines have followed.

The paved highway system of California constructed under the California State Highway Commission comprises something like 1800 miles of graded, smooth, hard surfaced roads out of about 3200 miles of state roads. In addition, the counties, cities and towns throughout the state have a mileage which undoubtedly aggregates considerably more than the state's paved roads in highways of modern type, and are steadily adding new paving.

*It would be hard to find a 10-mile stretch of inter-urban paved highway over which there is not at present an operating or projected bus line. Of course there are feeder lines operating over a considerable mileage of unpaved highway, including desert roads—but these are offshoots or resultants of the lines operating on asphalt.*

### Favorable Conditions

Once the bus lines are in operation, what conditions peculiar to California do they encounter? In the first place, they have a year round season without snow, sleet or ice. Even when it rains, which

is in the winter season, it is not uncomfortable riding in a motor vehicle. Temperatures seldom drop below 40 to 45 deg. Therefore, the problem of protection against cold does not arise either for the passengers or for the engines. Summer is entirely rainless. The well graded and smoothly paved roads make maintenance of schedules and economy in consumption of fuel, oil and tires, as well as ease of driving and comfortable riding for passengers, matters of such everyday experience that it is only the visitor from outside the state who considers them subjects of comment.

The extent of the paving system over which bus lines operate is astonishing. An official of one of the motor transportation companies took an inspection trip covering 1300 miles and only covered a small portion of the routes of his own and connecting lines. Of the whole distance only 25 miles was unpaved.

How much is bus operation benefited by the tourist traffic? In Lake County and some other districts north of San Francisco, and in the San Bernardino mountains of Southern California, there is a very heavy bus traffic of vacationists during the summer season. Of course some of these are in the tourist class but most of them are probably residents of California or nearby states.

Conditions as to classification of pat-

---

**M**ANY failures have been caused by inferior equipment. Reliability of schedules, comfort of passengers, territory covered and equitable rates were important factors that helped make the motor bus lines successful.

---

ronage are not very much different from those to be found during the summer in the summer resort districts of New England, upper New York State, etc. During the winter season, which is the real tourist season in the state, the motor buses receive a liberal patronage from a proportion of the tourist class who are not provided with motor cars of their own or do not patronize the numerous agencies renting touring cars with or without drivers.

Southern California is estimated to entertain at the present time an average of 100,000 to 150,000 tourists every winter. The business the buses get from these people is very great. The scenic route over the Ridge between Los Angeles and Bakersfield comes in for a lot of rides by sightseers. People going from the cities out into the ranching or small town districts naturally give preference to the bus lines over the railroads.

### Business Producers

*What is the biggest hold the motor bus lines have on public opinion which induces patronage? Comparing it with existing public transportation means in the state, motor transportation has demonstrated that it is quicker, more comfortable, more sanitary and affords a more frequent service than either electric or steam lines.*

The most dense traffic development in motor bus transportation within the state is undoubtedly in interurban haulage between points adjacent to Los Angeles. On the local lines of the Motor Transit Co., the haulage runs about 225,000 per month. Many of the customers are regular commuters. This class of patronage is attracted by lower fare, greater accessibility and more frequent service. While the bus lines still offer the public lower fares than the railways, it should be noted that the discrepancy between motor bus and railway fares was not as great at the start of the bus lines as it is at present. This is due to the fact that only one increase in rates has been applied for by the bus lines to the State Railroad Commission. When it is allowed, as it is expected to be in the near future, it will be the first raise, while the steam and electric lines have had two raises in the period since the buses have been in operation.

### Seats for All

An attractive feature of motor bus transportation is the provision whereby every passenger secures a seat. The regulations of the California State Railroad Commission do not permit a bus to start or operate with a number of passengers in excess of the seating capacity. This is a form of discrimination compelling the motor bus lines to maintain a more attractive type of service than is commonly extended by the interurban and steam lines, which are frequently overcrowded, but as the traditions of railway operation prejudice the officials of such lines in favor of forcing unsanitary and uncomfortable conditions upon the public in the form of crowding, and they profess to see financial advantage in it, they have made no complaint against the ruling favoring the buses by imposing higher standards, and the motor lines continue to enjoy this advantage.

### Reasons for Failures

Do not get the idea, because motor bus transportation in California enjoys advantages obtained from the climate, good roads, a service superior to railroads, and a favorable public demand, that it has been a mushroom growth accomplished without encountering any resistance. Each of the big lines now operating in the state is the result of patient and difficult pioneering.

The history of the development of the present state-wide network of bus lines shows a certain proportion of individuals who have entered the business and made failures. A very common error has been the attempt to render service with inferior equipment and when the equipment has broken down of course the service has suffered and the lines have got into difficulties, but each time someone else has begun where the other fellow left off. As an example of forward development, the Motor Transit Co., with headquarters in Los Angeles, of course is very prominent. This company started in December, 1916, carrying 6,000 passengers a month between Los Angeles and Anaheim. Now its vehicles operate



over 600 miles of highway extending from Bakersfield south to San Diego and from Los Angeles inland to San Bernardino, Redlands and Riverside, and carry 225,000 passengers per month.

In the early days of bus operation, the promoters of the lines requiring several cars to maintain a frequent schedule hit upon the plan of engaging as operators young men able to own their cars. The operating company leased the cars and hired the drivers separate from the cars at a flat rate of so much per run. This plan aided in getting drivers of a more responsible type, insuring a higher degree of reliable maintenance and careful operation of the cars and of course avoided the necessity of raising a large amount of capital in the name of the company.

### Control of Buses

At the present time it is the policy of the principal bus operating organizations to have all equipment owned by the company. This policy is being gradually put into effect. As a result of the experience along these lines, one of the operators believes that new interurban lines starting in other states might find it advantageous to open on the basis of having the company own half the equipment and lease the other half on a plan similar to that employed in the early days of California development.

Bus operators in California are confident that they operate more economically here than would be possible in other states with which they are familiar, where climatic and road conditions are less favorable. However, in reckoning things in their favor they give more credit to good roads than to favorable climate. Now that good roads are being gradually built and extensive development projects have actually taken shape in other states, the time appears to be close at hand when bus operators will have routes to cover which will compare favorably with those in California. The experience in California is that on well graded and paved highways, rain presents practically no interference whatever to operation on interurban lines.

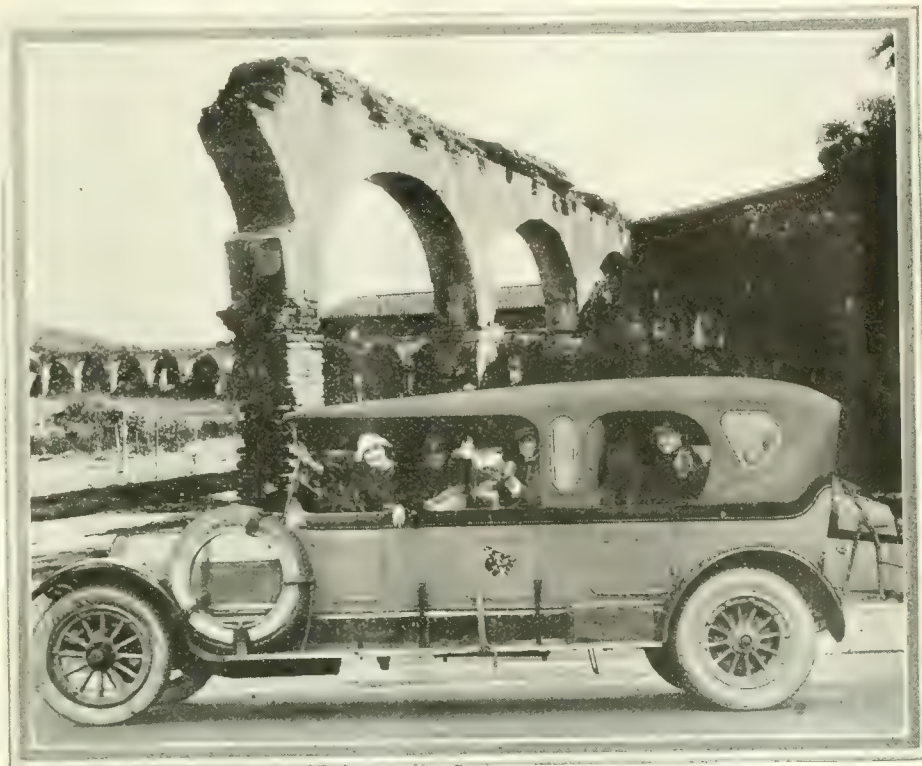
The country roads become washed clean in the first few minutes of a rain and then traction is good, although contrasting conditions are found in the cities, where the streets become covered with mire and grease and the paving is slippery all through a rain. The Coast operators believe that where traffic is dense and rates are adequate, if proper equipment is employed, an Eastern operator having routes over good paving would not have to worry much over snow in the average season. It is pointed out that street railway companies have found it practicable to clear their tracks of snow, which is necessary for operation. The same thing can be done to facilitate bus operation. It is quite possible to equip a motor bus for comfortable heating and ventilation in cold weather.

### Lower Costs

Lower costs, car for car, and mile for mile, are bound to show up in California,

the operators here believe, in comparison with anything likely to be experienced in other states. However, they point out that there are many states where a large number of routes should show a higher traffic density than is possible in most parts of California. A bus line starting in almost any state will enjoy the advantage of not having an enormous overhead, such as is very likely to handicap its railway competition, not only because

going to shop, to work or to transact business. However, the demand for long haul transportation is constantly forcing extension of operation. This summer the Pickwick Stages have run on schedule not only beyond the paving, but clear up through the mountains, making a through run from San Francisco to Portland, Oregon. As connection is made at San Francisco with other stages connecting with San Diego the Pacific Coast has in



*The frames have been lengthened to accommodate larger bodies. There is no crowding. Note the special doors to each compartment*

the railway has had to build and maintain an expensive right of way, but also in many cases it is well known that steam and electric railway systems have been forced to boost their earnings because they have suffered from stock watering operations in years gone by, when such things were possible, and in fact common practice.

Bus lines will not run the risk of incurring these charges because Railroad Commission control, under modern laws, especially provides means of controlling and checking unsound financing. Railway competition has always attempted to hang some kind of a drag on motor bus operators because they use the public highways. It should be clear that the use made of them is one which gives to the public itself the full benefit of its highways. The public built them and paid for them to give speedy and economical transportation—and that is what they get, through bus operation, in the quickest form at the lowest rate.

Once bus operation on a big scale is started, it is like the postal or telephone service—there is no place to stop. The public demands universal service. In California the bulk of the travel is in the vicinity of the big cities and 90 per cent of it is business travel, people

summer a service which would require, for an eastern counterpart, a seasonal operation on schedule between New York and Miami.

### Week End Traffic

In the highly developed local interurban traffic in the Los Angeles district it is the experience that the majority of the traffic originates in the small towns, people traveling to the big town and back. There is a lot of Saturday and Sunday travel originating in the big towns, people going out to the small towns to visit or to the mountains for a rest, so the week end traffic is about a 50-50 break as to points of origin. At the country end of most of the lines, and at important towns en route, light car feeder operators are developing rapidly throughout the state. Many of these feeder runs extend 60 miles or so from the main bus lines operating over the paved highways. As far as main line operation is concerned, the entire history of the business here has shown that success invariably and only follows the use from the start of high-class equipment. Motor bus operation in California is at present characterized by speed, comfort and responsible management.

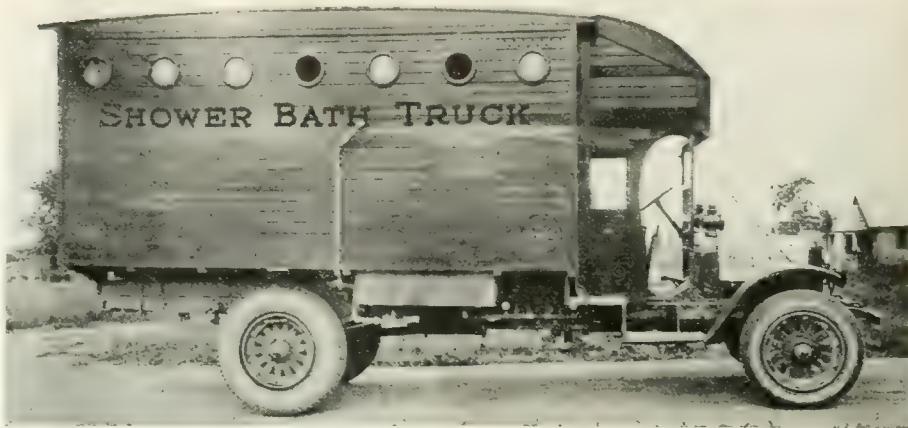


# How Trucks Play Many Parts

*Vehicles Put to Many Unique Uses*

## Getting Ready for Another Clean-Up Week?

**T**HE shower bath truck on the right was designed by the Republic Motor Truck Co. for motorized circus companies, military cross country runs and truck development tours. It has dressing and locker rooms, eight shower bath heads and automatically operated devices to keep the large water tanks constantly filled with hot water, so as to make the showers available at any time. The truck is a 2½-ton Republic and the body is of the moving van type.



## Hauling a Big Boiler 5000 Ft. Up in the Sierras

**T**HE illustration on the right shows a 5-ton Federal hauling an immense boiler 5000 ft. upward in the Sierras. Ten years ago it took 28 mules 3 days to accomplish this same work. The big 5-tonner finished the job in a day. The steep mountain grades up which the boiler had to be hauled were full of dangerous winding turns, often as steep as 20 per cent. In one place it was necessary to cut a flume to allow the truck to pass and many times it was necessary to cut down a fair sized tree and drag it behind as an additional brake.



## No Longer the Missing Link in Freight Haulage

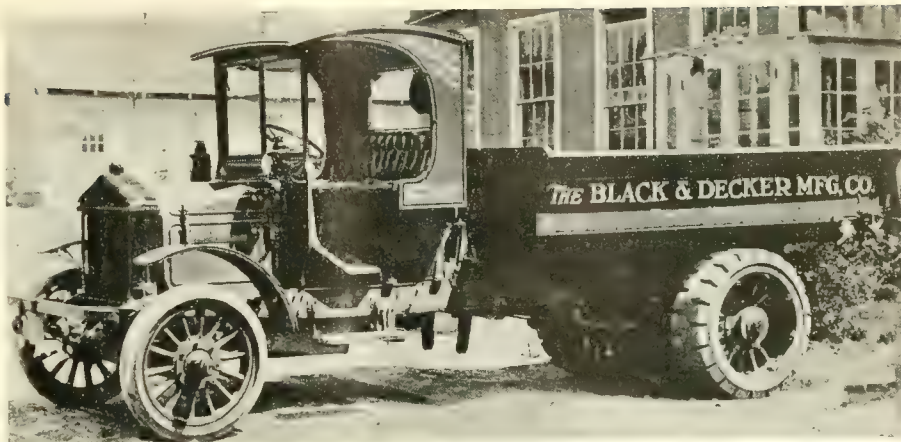
**T**HE illustration below shows how motor trucks are supplying the missing link in freight haulage. The down-town office of the Chicago, North Shore and Milwaukee R. R. is 6½ miles from its trolley terminal. Incoming freight, of which much is bulky, has to be transferred with dispatch to the trolley terminal. The illustration shows how three 5-ton White tractors with semi-trailers take care of this haulage. In each round trip 20 tons of freight are moved, each truck traveling from 100 to 150 miles in 24 hours.





## Saving Express Charges in Long Distance Hauling

ON the right is a Pierce-Arrow 5-tonner which is saving money for the Black and Decker Company. The truck operates between Baltimore, Md., and Ft. Wayne, Ind., and also between Baltimore and Cleveland. On a recent trip to Ft. Wayne the total expenses were \$335.46. The sum collected for charges at Ft. Wayne was \$185.03 and the expressage saved was \$282.86, a total of \$467.89. Thus the truck saved \$132.43 on this trip alone. The total mileage covered on this one trip was 1083 miles.

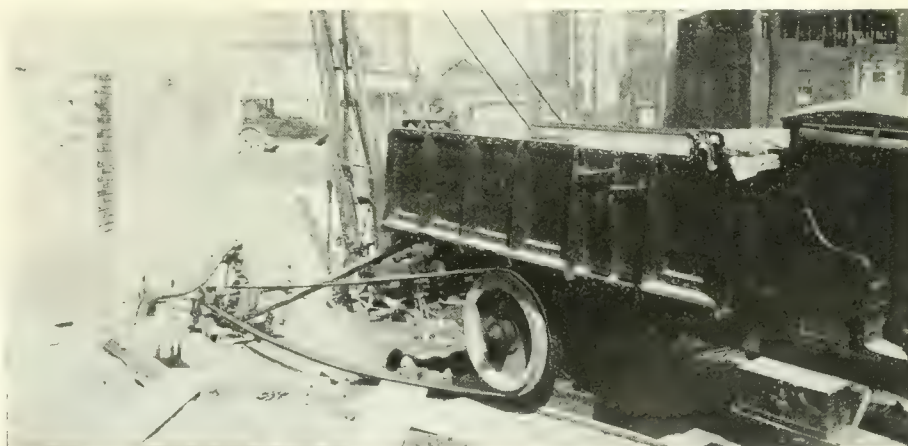


## Smaller Truck, in Same Work, Mounted on Pneumatics

THE illustration to the left shows another Black and Decker Pierce-Arrow truck, this time a 2-tonner. On a recent trip to Ft. Wayne this truck, which is in the same long distance haulage work, had a total expense of \$194.41. The same haulage by express would have cost \$156, so that the truck is debited with \$38.41 on this trip, but this is due to the fact that the truck went to Ft. Wayne with no load and therefore collected no charges.

## How a Truck Rear Wheel Was Used as a Pulley

IN erecting an ice plant recently a well was sunk, which it was hoped would supply the large amount of water required for the plant. To determine whether the volume was sufficient, a pump was installed for operation by motor and in order to save installing the motor prematurely, this 3½-ton Acme was pressed into service. The rear end was blocked up and a belt run from the pump to the truck rear wheel. The experiment was entirely successful.



## Truck Takes Care of Short Line Haulage Work

THIS truck on tracks takes care of short line passenger haulage for the New Orleans and Lower Coast R. R. Steel flanged wheels have been substituted for wheels on this FWD truck, but the standard construction remains the same. The railroad built the body, which has a side folding door and accommodates 32 passengers. The exhaust gases are used to heat the car. It is estimated that there are more than 600 short line railroads in the country which might more profitably handle their traffic in this way. The car is one man operated, another important saving.



# Cylinder Regrinding and Its Merits

By N. W. Durnin\*

**F**IRST of all, what is cylinder regrinding?

It is an improved method of finishing the bore of the cylinder, making it perfectly smooth, straight, round and absolutely at right angles with the base of the cylinder block.

It stands to reason that unless the finished bore of the cylinder possesses all four of these qualities, it is impossible for the motor to function properly.

The practice of most automobile manufacturers at the present time is to grind the cylinders as a final operation. By the grinding process of finishing a cylinder, the block is squarely clamped to an angle plate which is fastened on the bed of the cylinder grinding machine. There is a spindle on the machine which works on an eccentric, so that the wheel travels in such a way that the outside of the wheel is always in contact with the inside of the cylinder. There is an adjustment of the spindle which permits this eccentric to be increased to make up for the amount of metal that has been ground off, as well as the wear of the wheel.

## Scope of Grinding Wheel

It is probably unnecessary to mention that a grinding wheel will remove all metal that is in its path, regardless of whether it is hard or soft. In boring a cylinder you could never think of removing less than 1/32 in. under the best of conditions, and it is even doubtful if that little can be removed successfully on account of the glazed surface of a used cylinder.

Grinding will remove any amount from a few thousandths up, thus giving a much longer life to a set of cylinders.

The grinding operation may be likened to innumerable cutters revolving over the surface, as each particle of an abrasive wheel is in itself a sharp cutting tool that will retain its cutting qualities longer than any rigid steel cutter.

By boring, let us assume that the cylinder is placed in just as favorable a position as it would be on a cylinder grinding machine.

Let us consider the use of the most rigid tool that can be had. This tool may be securely fastened in the head of the machine, and the cutting blades protrude only a sufficient amount to remove the

stock that it is deemed necessary to remove. What happens when it comes in contact with a hard spot in cast iron?

There isn't a practical mechanic but knows that a hard spot in cast iron will either drive the tool back in the holder or will break or dull its edge, or, to say the least, the tool, not being able to cut the hard spot, jumps over it.

Then, too, we have soft spots to contend with in cylinders. When the tool reaches these it digs in. This means that a finished cylinder that has been bored may be full of lumps and depressions, although I must admit these are not

---

## What Would You Do?

If you knew that your cylinders were scored and were losing power?

If you knew that your engine was smoking, the pistons were slapping and that your oil and fuel consumption was out of proportion with the power delivered?

Do you know of the various ways of correcting these defects and which way is the best?

---

## This Story Tells You

always visible to the naked eye, and in some cases they cannot be measured by a micrometer. But if you were able to blue the cylinder, as in the case of a crankshaft bearing, and test it in the same way, you would find these lumps and depressions very visible.

Again, by the boring process there is a possibility that the striking of a hard spot will jar the cylinder slightly from its position, causing it to be bored out of line, and again by the boring process there is always a tendency for the cutting tool to follow the old hole, and if this old hole has worn out of square with the base, the new hole will be likewise. This applies more particularly to the reaming process. No matter how rigid you may hold a reaming tool, there is always a very strong tendency for it to follow the old hole, which is the line of least resistance.

How is the operator to know whether cylinders need regrinding or not? Now, to many this may sound like a ridiculous question, but it is not. Most of the

**Points That Should Be Considered by the Fleet Superintendent in Relation with Regrinding Establishments That Will Make for More Satisfaction in Running of Engine.**

larger service stations have inside and outside micrometers, and certainly all of them have calipers. If a service man measures a cylinder, let us say with an inside micrometer, and finds that it is 0.004 or 0.005 out of round, and that it is about 0.010 larger in the ring travel than at the open end of the cylinder, he will, of course, decide right away that it needs grinding.

In the case of a man who has no micrometers, he will depend upon a caliper, and I think you will all agree with me that it takes a mighty good mechanic to determine whether a cylinder is 0.002 or 0.010 out of round, or worn larger, by merely using a caliper.

Then, again, the man will try his piston, and if he finds that it is quite loose in the cylinder, and he has measured the cylinder with a caliper and finds that it is apparently round, his decision right away is to put in some oversize pistons, lap them in, and he is alright.

## Cylinder Lapping

When you start lapping, there isn't any question about it at all. You start wearing the bore of that cylinder larger, along the same lines that it has been worn before.

Very commonly, a cylinder is worn larger in the ring travel than at the open end where the piston enters the cylinder. This shoulder is sometimes very noticeable. By a lapping process you will wear down the shoulder, but what you have actually accomplished is the making of a taper. You have not overcome the variation in size between the part of the cylinder that is worn and the part of the cylinder that is not worn.

There is no way that you can work the piston that will enable you to lap it so that the cylinder will be round, and if the cylinder is not round you cannot expect to get rings to fit it. Lapping is a laborious process that is antiquated and inaccurate. I do not mean this as a reflection on the repairman who takes a set of cylinders that have been reground and laps them slightly to get the rings worn in. What I refer to is the man who endeavors to avoid regrinding by merely lapping in oversize pistons.

A customer recently brought to our factory the cylinder block, pistons, rings, wrist pins and connecting rods of an engine. His complaint was smoking and piston slap.

We measured each cylinder and found that they varied from 0.001 to 0.0015 in

\*Secretary, Houpert Machine Co. Extracts from a paper read before the May meeting of the Automotive Service Association of New York.



size, that they were all from 0.001 to 0.0015 out of round, and tapered to the same extent. The pistons had a clearance of from 0.004 to 0.0055.

### Excessive Clearance

To be perfectly frank about it, it seemed to me as though his greatest trouble was excessive clearance, and off-handedly, it would seem that if oversize pistons were fitted with a clearance of from 0.0025 to 0.003, that the man's troubles would be ended. But in order to check this up we put the cylinder block on a grinding machine, clamped it squarely to the angle plate, run the spindle into the hole about 1 in., got the wheel so that it was rotating around the cylinder just barely touching the cylinder walls, but not sufficiently to remove any metal.

You will all agree with me that if the bore of that cylinder was at perfect right angles with its base, it would be possible to run the spindle down through the entire hole without removing the slightest amount of metal. In other words, this would act the same as an indicator.

We started up the machine, agreeing with the customer that we would go through the grinding motions just once, and if that hole was perfectly true we could do no harm to the cylinder, and if it was not true we would make it true.

We had not gone 1½ inches into the cylinder before the grinding wheel began to cut on one side and to be absolutely free on the other, and as we progressed down through the cylinder this condition kept getting worse, showing that the cylinder was out of square with the base.

That particular cylinder block cleaned up at 0.020 oversize. The motor had only been used 5000 miles. It was not worn more than 0.0015. This is conclusive proof that the cylinder was very much out of square with its base, and it is unreasonable to expect that any motor could function properly in that condition.

### Scored Cylinders

There is another class of cylinders that come into the service stations quite frequently. I refer to those that are scored from a loose wrist pin. Some people junk them. Others fill in the score and use the same old piston.

I think it is a waste of good money to junk a cylinder that is merely scored from a loose wrist pin. I have no interest whatever in boosting the filling in business. It is something we do not do and we will not be responsible for, but it is a class of work that we handle for our customers.

There was a time a few years ago when this filling in was done by the acetylene process. That meant that the cylinder had to be preheated and the score welded in. That was an expensive operation and it was about the most undesirable proposition that could ever be put in a cylinder grinding establishment.

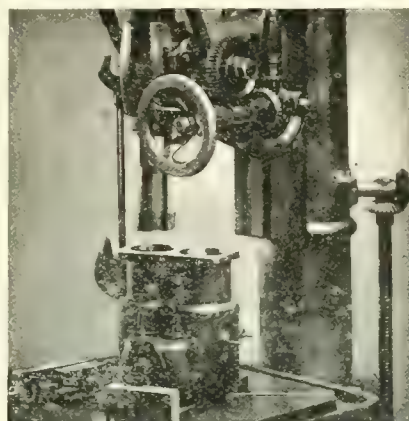
Whenever I saw one of these coming into our factory I felt that I wanted

to hide, so that the man to whose lot it fell to grind the cylinders would not be able to find me until after the job was completed.

### Filling in Score

That method has not been used in a number of years, and now the general practice is to fill in the score with a soft metal. There are several different concerns doing this work. I am not familiar with the process that has been used, but I do know a little something about it, and I am going to explain it from the layman's view rather than from the welder's view.

Let us assume that this filling in is nothing more nor less than ordinary sol-



*Cylinder secured on a drill press. By this method the cylinder can be set so the bores may be finished true with the base, but the basic objection to the boring method has not been eliminated; that is, the tool coming in contact with hard and soft spots*

der. You are certainly all familiar with soldering such a simple thing as a water kettle. That is nothing but a lead proposition, and lead will certainly melt very easily.

You fill that kettle with water, put it on a stove on an open flame. Just as long as you have water in it you will never melt the solder.

The same thing applies to the filling in of a scored cylinder. We have had hundreds of them done and I have never seen one melt out yet. But what I can honestly say is that the motor showed evidence of having been run without water or oil, possibly without both, and I do not think that we have had more than two or three failures all together.

Therefore, I am convinced that it is the height of folly to throw away cylinders that are merely scored from a loose wrist pin. Sometimes it is perfectly proper to use the old pistons without regrinding the cylinders, but I think that the repairman or the service man should think twice before he decides to pursue this course.

The cylinders should be examined thoroughly. They should be measured correctly, and the measurement alone is not sufficient. They may measure perfectly round, but if they are not ab-

solutely square with the base, then there is only one thing to do, and that is regrind.

After the regrinding, the next question is the fitting of oversize pistons. This is a matter of very considerable importance. What we consider the best practice is to supply the customer with a type of piston that is an exact duplicate of the factory sample, and this we do religiously.

Our aim has always been to make a piston that will be interchangeable with a factory piston. We always aim to adopt oversize standards that the factory adopts, and where the factory has not adopted oversize standards we follow the S. A. E. recommendation of 0.010, 0.020, 0.030 and 0.040 oversize.

By this method, it is our contention that a customer can always go to a service station no matter where he may be and get pistons, rings or wrist pins replaced without having to have them made special.

### Piston Manufacture

Pistons, apparently, are a very simple piece of machine work, but they must be made accurately and they are not as simple as the average mechanic may think. They go through a great many different operations. They are inspected at a number of different stages in their production, and every care is exercised to deliver a piston that the repairman can put into the motor, causing him a minimum amount of trouble in assembling.

The next important step is piston rings. The number of new types of piston rings that come out every year is amazing, and there are just as many that go to the graveyard. Some of these rings have considerable merit. Some of them have their greatest asset in a name and by name I do not mean reputation.

Getting back to the first principle, and old-fashioned, plain, one-piece, snap-type piston ring has been used from the start of the automobile industry up to the present time, and there are more of that type of ring used to-day than ever.

There are two distinct theories in the manufacturing of piston rings. One is that the escape is at the joint. The other is that it is around the circumference.

I think it would be well to ask ourselves of what use is the piston ring? What is the reason for its existence?

If the piston could be fitted in the cylinder tight enough so that it could compress the gases in the compression chamber without their leaking past the piston, then there will be no excuse for a ring.

### Heat Expansion

The reason that a piston cannot be constructed is that due to expansion from heat the metal would seize and the motor would stop entirely.

It is therefore necessary to give the piston a sufficient amount of clearance to enable it to work freely in the cylinder, and by putting in the ring, which is narrow and flexible and has a suffi-





*Cylinder strapped to face-plate of lathe. This method is limited to such cylinders as can be rotated. Blocks of four to six cylinders are so long that it is impossible to rotate them on any but a gap lathe, as the center of the first hole must be in the center of the face plate of the lathe*

cient amount of spring to hold against the cylinder walls, it prevents the gas from escaping, and when properly fitted will not seize.

From our observation of piston rings, I am fully convinced that the greatest loss of compression is around the circumference of the ring, rather than on its joint, and I feel that the class of manufacturers who put their greatest efforts toward making a ring that will hold compression on its entire circumference rather than confining their efforts to the joint, are more nearly on the right track.

### Fitting Piston Rings

The one important point that I would bring out is that the final test of the piston ring is to fit it to a gauge of the size to which the ring has been ground and hold it to the light to determine whether or not light can be seen between the ring and the gauge. If light can be seen, that ring is not round, and unless it is rejected it is going to cause serious trouble to the user.

The fitting of the ring in the cylinder and to the piston is another important point. The ring must be fitted so that it bears evenly in the groove. It must have a sufficient end clearance, but not too much. This end clearance is given to the rings to permit expansion due to the heat created by running the motor.

Where a mechanic attempts to do this fitting with a file, he may get good results if he is a good man, but it has been our practice to do this by machinery, as in this way the man element is largely eliminated.

One of the next points is wrist pins. Wrist pins are another commodity that the long suffering public has been buying, in too many cases, on a basis of price rather than quality. The selection of the proper material from which to make the pins is an important element, but one of the most important is the hardening of the pin. Case hardening is a specialty, and there are all degrees of hardening to be had in New York and vicinity, but the degree that can be had most easily is the lowest degree.

The ordinary way of testing a wrist pin to determine whether or not it is hard is to try to file it, but that method

is now supplanted by a more reliable method known as a scleroscope, which will give the exact degree of hardness. A pin that will not test at least 70 on the scleroscope should not be used. A test of the wrist pins that are obtainable from many sources will show these pins to run as low as 40 to 50.

On this point it may be well to caution service men in general about the selection of pistons, rings and wrist pins. The pirate part industry has not confined its operations to ignition parts alone, but have entered the field of pistons, rings and wrist pins to an alarming extent. A great deal of this material can be found, which would certainly not stand a very critical examination. The parts may look good to you, but you do not see them when they are working in the motor, but you know they are there. The good parts you do not see either, but they give you so little trouble that you forget they are there.

### Rejected Pistons

A number of motor car manufacturers give orders to various machine shops for the making of such parts as pistons, rings and wrist pins. When the order



*A condition that is common to cylinders that are worn from the constant pressure of the rings against the cylinder walls. As the open end of the cylinder is not worn, the rings to enter must be of standard size. When they are working in their normal place they open up, and as that part is worn often to an oval shape, the rings cannot hold against the wall*

has been completed there is usually a large rejection. Did it ever occur to you what becomes of these? If this rejection took place in the factory, the parts would be junked. If it took place in the ordinary shop, these people start looking for a market and the rejected parts very often find their way into the service departments of the same motor car manufacturers, who had previously rejected them.

A piston may be rejected because the hole is a few thousandths out of square with the skirt of the piston. There are mighty few service men who would have the proper instruments to check this inaccuracy, and invariably they are put into stock without any examination whatever. I can show you piston rings that look mighty nice, but nevertheless

they are junk. There may not be a flaw apparent, but if the ring shows light upon inspection, that is the best reason in the world for rejection. I could show you wrist pins that might look very good, but, nevertheless, these pins have not showed the proper scleroscopic test and, therefore, cannot be used.

In comparing prices of these commodities purchased from a legitimate manufacturer with the price that you would pay to some of the jobbers of questionable reputation, you might find a very wide difference, but in the long run the commodity that does not stand up and does not function as it should, costs the consumer a great deal more than the part for which he will pay a little more money at the outset, and have with it the assurance of a perfectly legitimate manufacturer that it was made to stand the purpose for which it was designed.

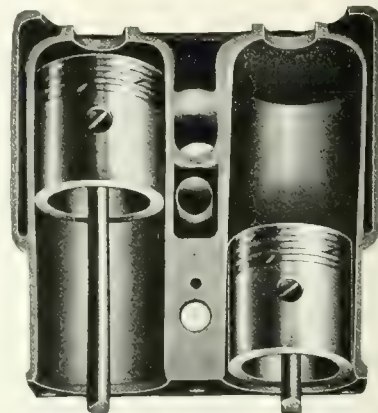
The best cylinder grinding job that could possibly be done by anyone can be ruined in a few minutes by a mechanic who fails to assemble the motor properly.

One of the most important points in assembling a motor is to square the pistons. I assume that every man here knows what I mean by squaring a piston, but it would surprise you to know how many men there are who undertake a job of overhauling a motor, who haven't the slightest idea of what is meant by that phrase.

I had a man one time ask me what I meant by squaring a piston when the piston was round. At least, that man was frank and admitted he did not know. There was a chance of teaching him, but the man who says he does know but does not use that knowledge is the worst type we have to contend with.

### Squaring a Piston

When you see a piston that shows evidence of bearing hard at the top on one side and at the bottom on the opposite side, you can rest assured that that piston has not been properly squared when the motor was assembled. You can fit pistons to a motor with from .002 to .003 clearance when the pistons are properly squared and the motor will



*Cylinder bored out of square with the base. The piston cannot work free as it should. For the purpose of illustrating the point, the fault is exaggerated, as few engines are in such a bad condition*



turn over freely. If you fit pistons to a motor the least bit out of line and you have even .004 or .005 clearance, there will be a terrible binding and the motor will positively not work free and ultimately it will heat up and seize. The piston rings cannot work square against the cylinder walls if the piston which carries them is not working square and there is a strain on the wrist pin which will cause excessive wear either on the pin or the bushing.

I cannot place too much emphasis on the absolute necessity of squaring pistons properly in assembling a motor. There are various ways by which this can be done, and it *must* be done if the repairman expects to turn out a satisfactory job.

One of the most simple and ordinary ways of squaring a piston is by the use of a machinist's square. After the pistons have been assembled on the connecting rods, and the connecting rods are securely fastened in place on the crankshaft, rest the base of the square on the top of the crankcase so that the side of the square comes against the skirt of the piston.

Make sure that the square touches perfectly against the skirt of the piston on both sides or that the space between the top of the piston and the square on both sides is exactly the same, as it is understood that there must be space between the square and the piston on the top of the piston, because the piston is ground smaller at the top to take care of the greater expansion at this point.

### Use of Dummy Cylinder

Another way that is quite frequently used in factories and in service stations where there is one or two types of motors handled exclusively, is to have the pistons assembled with a dummy cylinder cut in half. By fastening the connecting rods and pistons to this dummy motor, you can determine whether or not the pistons set square in the cut cylinder and if they do not, bend the rods until they do. Then reassemble on the original motor.

Another method would be to assemble one piston at a time on the original motor from underneath. Turn the crankshaft over once or twice, then take off the piston and see whether or not it is bearing perfectly square. It might be well in this method to blue the piston slightly.

Another method would be to assemble the connecting rod on to the crankshaft without the piston. Then put a rod about a foot long through the wrist pin hole. This rod must fit tight in the wrist pin hole the same as the wrist pin itself. Have the rod protrude an equal distance from each side. Then use a surface gauge with a scribe or a dial indicator, and by this method determine whether or not the rod is parallel with the crankshaft. If it is not, bend the rod as outlined before until it is parallel.

The question sometimes comes up with mechanics as to why a piston should not be square when the motor is reassembled after the cylinders have been re-ground, when he is sure that it was per-

fectly square when he took the motor down. Sometimes mechanics go so far as to say it is the fault of the piston. That is not so. In scraping the bearings you have no assurance that you are not taking off slightly more on one end of the connecting rod bearing than you are on the other, and a slightly greater amount off one end of the bearing throws the connecting rod out of line with the crankshaft. Again, in removing the block sometimes one end is raised up higher than the other. This is bound to slightly bend the rods.

The same thing applied to putting a block on. If the pistons are in place, it is not an easy matter to put the block on without bending the rods. It can be done and it is done every day, but it requires care.

### Mysterious Engine Trouble

Sometimes the cylinder grinder is blamed for subsequent improper working of the motor when he is not guilty. There are a number of peculiar experiences that we have had in our several years' experience. One alone might be a profitable one to relate at this point.

I recall a repairman for whom we had done a great deal of cylinder grinding and he had always been very well satisfied. We delivered a four cylinder job to him on one occasion and the motor was running less than one hour when it stopped dead. He tried to start it again, but no go. He was obliged to dismantle the motor and he found that two of the pistons had siezed and the others were scratched and in a very short time they also would have siezed. Of course, he blamed us for it.

An examination of the job showed that there was proper clearance and the pistons had been squared perfectly. The man claimed, as all repairmen do, that he had plenty of water and oil. We did that job over again and he reassembled it, and made absolutely certain that it was put together properly. This time it ran about five minutes, and stopped. Then he said, "Well, I guess we will look somewhere else for the trouble."

### The Solution

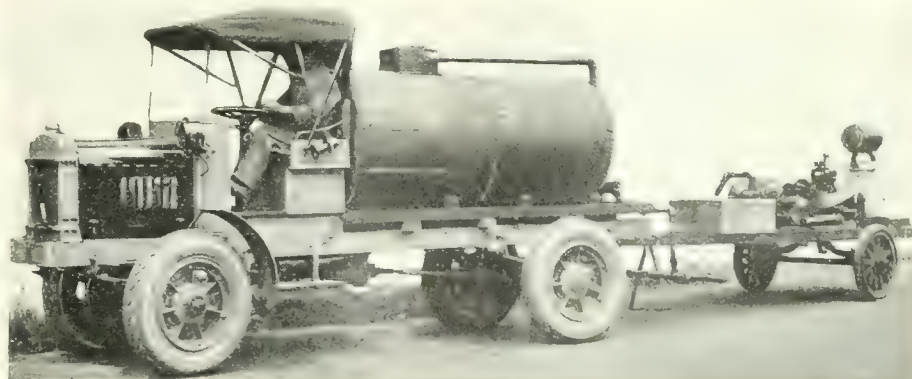
He found eventually that there was a hole in the float of the vacuum tank,

and that as a result of this, he was pumping raw gas instead of vapor into his cylinders. The raw gas was wiping off all the lubricating oil and the rest you know. This man was honest; he told us exactly what had happened, so we had the benefit of his experience in this instance.

### Inattention Is Costly

Every man here knows that he would not think of putting a truck together where there was a little play between the spring bolts and the bushings. Of course, he puts in new bolts and new bushings, but suppose you did not put in new bolts and bushings. What harm would it do? You just simply have a little noise, that is all. Your truck would go just the same, but with the cylinders it is quite different. There is only wear on your spring bolts and bushings when your truck is rolling along, and most of the wear comes when you are going over roads inclined to be rough, but there is wear in your cylinders all the time. Your car may be standing and the motor running, and all this time there is wear on the cylinders. The oscillating movement of the springs is a very slow movement compared to the rapid movement of the pistons. There is lubrication in the spring bolts and of course there is lubrication in the cylinders, but lubrication only minimizes wear, it cannot eliminate it. It is not reasonable to expect that a motor will run for 20,000 to 30,000 miles without showing wear in the cylinders, and it is most unreasonable to consider putting the motor together with wear in the cylinders. If the cylinders are worn, the rings cannot hold tight against the cylinder wall and you cannot make round rings fit on oval surface, all the claims of the patent ring manufacturers to the contrary notwithstanding. If your cylinders are worn, your power is going to be weak. You are wasting oil; you are wasting gas. You deliver a certain amount of gas to the compression chamber in the hopes of getting a certain amount of power, but a part of that gas goes down past the rings, finds its way into the crankcase, thins the oil and in some cases, the lubricating oil in the crankcase is as thin as the gasoline itself. You cannot get power this way.

## For Oiling Roads in Illinois





# A Big Step in Transportation

*Containers Save Crating, Labor, Damage, Demurrage and Freight Yard Congestion*

THE fleet owners of this country face a thousand daily problems in operating their trucks and in planning for the future of their trucks and the expansion of their business. But back of all these smaller problems looms the one big problem of future transportation. If we can solve that one big problem—if we can decide upon and install a national transportation system which will incorporate highway, waterway and railway transportation with the least possible friction and the highest possible efficiency—we shall solve a thousand smaller problems at one sweep.

## Means Real Co-operation

The conception and installation of the container car is a big step toward solving the big problem. It means saving time, loss, confusion, damage and money in transportation. But it means more than that—it means real efficient co-operation between trucks and railroads—a consummation greatly to be desired.

The mission of the container car is to expedite delivery of less-than-carload volumes of freight. Its use calls for co-ordination of carriers—steam and electric railroads and motor trucks.

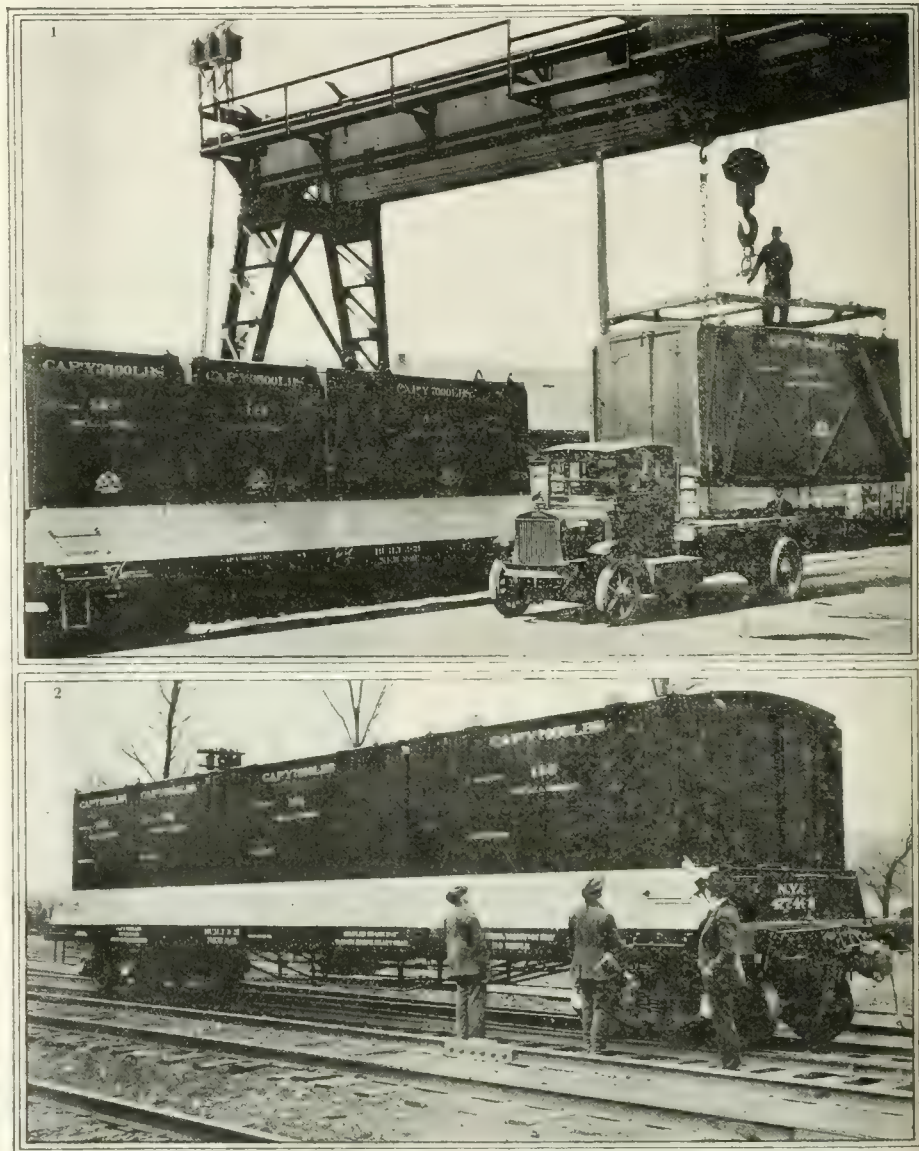
Vault-like compartments, built to occupy 1/3 or 1/6 the floor space of a 50-ft. container car, or 1/9 the floor space of a 66-ft. express car, are loaded at the warehouses of shippers, transported by motor trucks to the railroad yards, there lifted by crane to the freight or express car and secured by hooks and steel guides.

Arrived at their destination, the containers are again lifted by crane to motor trucks, rushed to the consignee's doors, unloaded and returned to the railroad yards either empty or reloaded.

## Many Other Advantages

The containers have many advantages. The elimination of rehandlings between shipping and receiving points eliminates the need for costly crating. It also makes necessary the use of fewer checkers and clerks. Then, too, prompt unloading at store doors eliminates demurrage. The system also releases freight cars immediately and clears freight yard tracks of idle cars, reducing congestion at platforms.

The container cars are of two types, one for express and one for freight. The nine compartments of the express type have each a capacity of 3 tons. The freight type carries compartments of two sizes and can accommodate two



1—White 5-tonner transferring containers to a New York Central container car at Cleveland. The shipment was consigned to Chicago. 2—The same freight car with two large and two small containers. Note the burglar proof construction of the freight car

large and two small, one large and four small or six small containers. The small size holds 3500 lbs., the large, 7000 lbs.

The steel containers, besides being fire and weather proof, are made burglar proof by setting them on the cars in such a manner that the doors, even if they could be unlocked, could not be opened without hoisting the whole compartment above the steel bulkhead behind which it fits.

The containers shown here took from 3 to 8 minutes to transfer from car to truck and 5 or 6 minutes lifting each loaded vault to the car. Loading the compartments took just about half an hour.

On this trip the containers were loaded with paints, dental gas, groceries, etc. Every article reached its destination undamaged and in the same position as it was loaded.



# Look Around Now and Then

By  
Sinclair Gluck



"ROSS, I want you to swim to the raft and climb out!"

Ross, the garage superintendent, had come for one of his occasional talks with old Silas Gunther, president of the big commercial house. Gunther, or Old Hammerhead, as he was sometimes affectionately called, had developed a habit of holding these talks with his employees, to the mutual benefit and appreciation of all concerned. But this time his opening remark rather stuck the younger man.

"Well, I went for a swim yesterday, it's true," he answered. "But I don't know how you knew it, sir!"

Old Hammerhead laughed. "I didn't know it, Ross. I was speaking figuratively."

The old man paused a moment. "The fact is, Ross, I went bathing myself a few days ago. I used to be a pretty good swimmer. And I enjoyed getting into the water again. But this place where I was bathing was a swimming club and while I was in the water they began holding some cup races on a small scale. 'I wanted to see the swimmers, Ross, but there was a little breeze blowing and I was pretty busy keeping my head above water. Besides, while I was swimming I couldn't get a very steady view and I was too low down to see much anyway. So I had to swim to the raft and climb out on it before I could see the races.'"

Old Hammerhead laughed again. "I'm not really talking about swimming, Ross. I'm talking about your work right here in the business."

"We're all swimming, Ross. In the truck industry—manufacturers, dealers, owners, superintendents like yourself and drivers—everybody is swimming his best, we'll say. But even so, some are swimming better than others of the same class. I think it may pay better sometimes to leave off swimming along in your own way for a bit and climb out of the water, so that you can look around and watch the work of others who may be better swimmers than you are. Do you see what I mean?"

Ross smiled. "Yes, sir, I get you now."

Old Hammerhead looked up suddenly. "I wonder whether you do entirely get me, Ross?" he queried. Then, after a pause, "You see, what I want you to realize is the fact that while you are swimming yourself, not only are you too busy to look around you much, but you couldn't see around you if you did look. You're too low down—too swamped in preconceived ideas about things to get a really broad view of what the other fellows are doing. That's why I said that I want you to swim to the raft and climb out. I want you to take an occasional look around at the other swimmers."

"But I want you to do more than look at the other fellows. I want you to get a good comprehensive view of the whole blamed ocean. I want you to see what we're all swimming toward. I want you to make up your mind whether you think some of us, or all of us, are swimming in the right direction or in the wrong direction. But you'll have to get a raft and climb out on it to do that."

Old Hammerhead paused and tapped his desk reflectively. "For example, Ross," he continued, after a moment, "What do you know about store-door-delivery?"

Ross stared at him in surprise. "Why I-I don't know much about it, sir. It's some scheme for standardizing the delivery of freight shipments to the consumer, isn't it?"

"It's that and it's more, Ross. It's a big scheme and it has a lot of enthusiastic backers, who are fighting an uphill fight to get you and me and a lot of other busy swimmers to take an interest in it and to realize what it may mean to us and to transportation generally."

"Then, too," the old man went on, "what do you know about the use of container cars in connection with the store-door-delivery scheme?"

Ross shook his head. "To tell you the truth, sir, I never heard of them."

Old Hammerhead smiled. "They're a sort of demountable truck body, Ross, that is loaded by the shipper, transported by truck to a container freight car, hoisted onto the car, carried to the con-

sumer's town by rail, transferred to another truck chassis and carried to the consumer's door, where it is unloaded for the first and last time."

Ross whistled. "Sounds like a pretty good scheme to me, sir."

"It may be and it may not. But who do you think is going to put such a scheme across if it is good?"

Ross shook his head.

"Why, you and I Ross, and people like us, who are swimming in the ocean of truck and freight car transportation. But if we don't climb out and look around, we never hear of things like this."

"Then there's the question of parts service for owners and operators like you and me. There's a big riot on just now in the automotive field, over the question of whether the parts manufacturer, or the truck assembler should service the parts that go into the assembled trucks. The one side says one thing and the other side says something else. But who will make the ultimate decision? Why you and I and others like us—the people who are directly affected and to whom all these people cater—if we'll only quit swimming long enough to look around and see what is going on."

"That's what I mean by swimming to the raft and climbing out. I don't want you to neglect your work, Ross. You know that. Nor do I even wish to suggest how you should arrange your work so that you can take a look around from time to time. That's your business."

But I do suggest that you should keep in touch with the movements—even the slow, under-the-surface movements—in the ocean we are swimming in, see if you can make out where we're all swimming to and—keep an eye out for sharks!"

Old Hammerhead laughed. "Then, Ross, I want to be able to call you back here, talk these things over with you and get your ideas on what we had better adopt and adapt to our own business. That's the gist of it, Ross."

Ross got to his feet. "Guess I have been kind of missing out on some good bets," he said, "but I'll keep my eyes open after this, sir!"

# Analyze Your Truck Costs!

## An Analysis of the Detailed Costs on a Department Store Truck as an Example of How to Check Your Costs and Stop Leaks

EVERY set of cost figures taken from the books of a fleet owner is of general as well as of special interest. Such figures are of special interest to some, because they give, if they are at all accurate, the cost of delivery in a certain line of business. Men in that line of business can therefore profit by a careful comparison of the figures with their own, allowing a certain leeway for special conditions.

But such figures are of general interest because they almost always contain, between the lines perhaps, some product of the mind of the owner, some special method of figuring, some misapprehension, perhaps, and some evidence of specially good or specially bad administration.

### Department Store Delivery

The sample cost sheets shown on these pages contain the costs on operating a  $\frac{3}{4}$ -ton G. M. C. truck, owned and operated by Donaldson's Glass Block Store, of the L. C. Donaldson Co., Minneapolis.

This particular truck is one of a fleet of 15 G. M. C.'s. It was purchased in November, 1918, and the costs shown cover the period from July 1, 1919, to July 1, 1920. During that period, the truck was operated 290 days and traveled 13,050 miles.

The total cost of operation was \$3,720.10 and the truck delivered a total of 39,150 packages. This means a total of 880,875 package-miles at a cost of \$0.0042 per package-mile, a cost of \$12.83 per day operated, \$10.19 per day maintained and a final cost of 9½ cents per package, as the cost sheets show. The cost per mile operated was 28½ cents.

### Miles to the Gallon

It will be of general as well as special interest to take the charges on the left hand sheet and analyze them, item by item.

In the first place, the cost sheet shows that the truck used 1684 gallons of gasoline for a total of 13,050 miles. This works out at 7¾ miles to the gallon, not a startlingly good mileage for so light a truck, but not bad, considering the number of stops which the vehicle made, the traffic it encountered in operating in a city like Minneapolis and the necessity for running in low gear at times.

During the entire year, the truck used 260 quarts or 65 gallons of oil. This works out at about 200 miles to the gallon or 50 miles to the quart, which is a little less than a quart a day, ample to keep a small truck lubricated under ordinary conditions.

Next comes the driver's wages. This

pay of \$4.33 per day is about the average.

Coming to the cost of tires, these are high, even on a mileage basis. But the truck is equipped with pneumatics and while 5 cents a mile is above the average charge, especially for a small truck, the saving in depreciation on the truck and

The Commercial Vehicle—Truck Cost System			
Year ending <u>July 1</u> 19 <u>20</u>		Gasoline <u>Electric</u>	
Make of truck <u>G. M. C.</u>			
MONTHLY COST SHEETS U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST., NEW YORK			
<b>Operating Charges</b>			
Gasoline	<u>1684</u> gals.	\$ <u>.27</u>	\$ <u>454 68</u>
Current	kw-h		
Oil	<u>260</u> qts.	\$ <u>.15</u>	<u>39 00</u>
Grease	lbs.		
Kerosene	gals.		
Waste	lbs.		
Dist. Water	gals.		
Driver	<u>290</u> days	\$ <u>4.33</u>	<u>1255 70</u>
Helper	days		
Mechanic	hrs.		
<b>A—Total Operating Charges</b>			\$ <u>1749.38</u>
<b>Maintenance Charges</b>			
*Tires	<u>13,050</u> miles	\$ <u>.0528</u>	\$ <u>689 04</u>
Repairs			
Overhauling, painting, etc.	<u>Estimated @ \$ .0345</u>		<u>450 00</u>
Space vehicle rental			
Garage rental (pro rata)	<u>@ \$ 120 per year</u>		<u>120 00</u>
<b>B—Total maintenance charges</b>			\$ <u>1259.04</u>
<b>Fixed Charges</b>			
Insurance, fire		per year	\$ <u>150 00</u>
Liability		per year	
Collision		per year	
Interest	<u>6</u>	(On Item 1—12)	<u>77 51</u>
Depreciation on chassis			
Depreciation on body			
Depreciation on equipment	<u>Estimated life 57,500 miles</u>		<u>415 00</u>
*Depreciation on tires			
Total taxes and licenses	<u>Tax and License</u>		<u>3 17</u>
	<u>Administrative Overhead</u>		<u>66 00</u>
<b>C—Total fixed charges</b>			\$ <u>711.68</u>
			<u>3720.10</u>
*Note: Omit one of these.			

Complete and accurate costs on a  $\frac{3}{4}$ -ton G. M. C. truck engaged in parcel delivery for a big department store. The costs are laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. The mileage of 13,050 is a very respectable figure for a truck in this class of work, averaging as it does 45 miles per day



in breakage on the goods carried would probably more than make up for the high charge for the tires.

### Repair Charge Too High

But the charge for repairs would seem too high. The actual repairs on the truck during the year cost nothing at all—that is, there were none. A light truck, mounted on pneumatics and driven with a reasonable amount of care and inspected at regular intervals should not develop repairs costing \$450 even during the fourth year of its life and certainly not during the first year. That is to say, an average charge of \$450 for repairs means \$1800 for repairs during the 4 years—for the truck is depreciated on a 4-year basis. This is too high, altogether, unless this item is intended to include some such items as the cost of spare parts stock and the

interest on same, or mechanics' wages, etc.

### What the System Costs

On these two pages are shown filled-in sample sheets of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

The charges for garaging and for insurance require no comment, as they are about the average and the garage charge at least will vary with the locality, rents, etc.

But the interest charge is worthy of note. The total investment amounted to \$2,067. The interest was estimated at 6 per cent. But 6 per cent on \$2,067 is \$124.02, not \$77.51 as listed on the cost sheet.

### Interest Correctly Charged

This is the reason: The truck is depreciated at the rate of 25 per cent or about \$513 each year. As the truck pays this sum back to the business or back to a sinking fund, owing to the fact that this amount is deducted from the truck's earnings, therefore this sum is drawing interest for the company as soon as it is repaid, and this interest cancels the interest on a similar amount of the original investment.

This is the correct way to figure truck interest. Therefore, while the interest for the first year is 6 per cent on \$2,067, or \$124.02, the interest for the second year is 6 per cent on \$2,067 less \$513.50, which is \$1,553.50, or \$93.21. In the same way, again deducting the amount depreciated from the lessened investment, the interest for the third year is \$62.40 and the interest for the fourth year is only \$31.59.

In order, however, to arrive at a fixed yearly sum which can be charged against the truck as interest, these four items of interest are added together and divided by four, which gives a yearly charge of about \$77.51. Figuring by the above method, the actual yearly amount would be \$77.80, but there are other ways of arriving at the same result, which would account for the difference of 29 cents.

### Mileage Basis Depreciation

It has been indicated above that the depreciation on this truck has been estimated on a four year basis. This is substantially correct, for purposes of estimating the interest, but the depreciation is actually on a mileage basis.

The truck owner has allowed his truck a life of 55,000 miles. He has divided that number of miles into the original cost of the truck, less tires, and has arrived at a depreciation rate of \$0.0318 per mile. The first year's mileage on the truck was 13,050 miles which is about one-quarter of the 55,000 miles allowed the truck, so the life still works out at about 4 years, provided the yearly mileage is maintained.

Lastly, there is the administrative overhead, which is charged against the truck as a regular yearly charge of \$66. It is not clear exactly what this is intended to include, but probably it is the cost of administering the fleet, aside from salaries. At all events, it is interesting to note that such an item has been taken care of on the truck cost record books.

### The Commercial Vehicle—Truck Cost System

Number of Truck 16

Capacity in lbs. 1500

Chassis No 34-FKv

MONTHLY COST SUMMARY SHEETS

U. P. C. BOOK COMPANY, INC. 241-249 WEST 39TH ST. NEW YORK

#### Investment

Cost of chassis, less tires	\$ 1,383.00
Cost of body	367.00
Cost of equipment	
Cost of tires	317.00
1—Total cost, complete	\$ 2,067.00

#### Performance Record

2—Days operated	290
3—Days idle	75
4—Days maintained (Item 2—Item 3)	365
5—Total hours operated	1320
6—Total miles covered	13,050
7—Total trips made	290
8—Total <del>commercial</del> package-miles <del>or stop</del>	39,150

#### Performance Averages

9—Average miles per day maintained (Item 6—Item 4)	35.75
10—Average miles per day operated (Item 6—Item 2)	45
11—Average miles per trip (Item 6—Item 7)	45
12—Average <del>commercial</del> package-miles per trip (Item 8—Item 7)	135
13—Average commercial <del>ten-mile</del> package-miles <del>or stop-mile</del> per trip	3037.5

#### Recapitulation

14—Total expenses for <u>year</u> (Sum of Items A, B and C)	\$ 3,720.10
15—Cost per day operated (Item 14—Item 2)	12.83
16—Cost per day maintained (Item 14—Item 4)	10.19
17—Cost per mile operated (Item 14—Item 6)	.285
18—Total commercial <del>ten-mile</del> package-miles <del>or stop-mile</del> (Item 7×Item 13)	880875
19—Cost per commercial <del>ten-mile</del> package-mile <del>or stop-mile</del> (Item 14—Item 18)	.0042
20—Cost per package (Item 14÷Item 8)	.095

Performance Record, Performance Averages and the Recapitulation of the costs of operation laid out on the sheet on the opposite page. The total expenses for the year amounted to \$3,720.10. The cost per day operated was \$12.83 and the cost per day maintained was \$10.19. The cost per mile operated was 28½ cents and the cost per package, 9½ cents

# The Better Way

## To Save Time in Truck Repair and Maintenance

### No. 482—Steel Channel for Straighening Work

A 5 FT. section of a 12 in. steel channel provides a serviceable feature for the repairshop in straightening front axles, shafts, truss rods, or other parts of the chassis. The upper face of the channel affords a hammering support for work which can readily be straightened out with a sledge, while its length is such to readily accommodate long brake rods, steering shafts, cross steering rods and similar parts. As is shown in the sketch a screw pressure lever and "V" blocks is used between the sides of the channel when a steady pressure is required to straighten drive-shafts, axles, crankshafts, etc., making these exactly true.

The screw lever is made from a 1 in. diameter cold rolled steel and this engages a threaded hole in the upper edge of the channel. Two "V" blocks of cast iron for the part to rest in and a third block for the end of the screw with a guide in this for the screw are all the parts required. The channel is bolted down solidly to the edge of the bench to permit of attaching heavy "C" clamps to hold the larger shafts from turning over when these are being straightened.—W. A. ANDERSEN, Franklin, Pa.

### No. 483—Square Off Ford Valve Stems

IT is possible to square off Ford valve stems by holding a file level on the push rod and turning the valve with a valve tool.—J. O. Lay, Newark, N. J.

### No. 484—Platform for Engine Stand

FLEET superintendents who have added engine stands to their shop equipment and who are at a loss as to just how to securely mount them and still have them portable will find a suggestion in the accompanying sketch. In this sketch is shown a wooden platform made up by nailing boards together with the grain running at right angles. This makes a good support for an engine stand and allows it to be moved around the shop to suit requirements.—R. BROWNE, Medford, Ore.

### No. 485—Screw Jack for Removing Main Bearings

IT is often difficult to remove the main bearings from an Autocar engine. A good way in which to overcome this dif-

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

ficulty may be found in the accompanying illustration. Two ½-in. soft steel rods, 10 in. long, have been cut and welded to ½-in. rods, 4 in. long. The two shorter pieces, which serve as handles, are at right angles with the other rods in the center. By placing an old bushing at each rod end, the screw jacks are completed and ready for work. Each jack is placed on either side of the crankshaft so that the bushings may bring pressure against the two bearings. The next operation is to screw out on the nuts, holding the rods stationary at the same time. The bearings will then come out.—H. N. STEVENSON, Trenton, N. J.

### No. 486—Drilling a Hole Dead True

A HOLE can be drilled dead true, even in an irregular piece by center punching both sides, starting the drill in one side, drilling a mark in the table or block and then turning the work over and drilling from the other side. A steel ball placed in the groove of the piece to be drilled and also the table groove will help to steady the piece.—H. GRANT, Orange, N. J.

### No. 487—Casting a Smooth Babbitt

CASTING a smooth babbitt is sometimes made difficult, due to the fact that there is a lack of smoothness on the shaft. Surface cracks are often the cause of trouble and in order to bring about ideal conditions, it is a good plan to coat the shaft with soot from a kerosene lamp or gas flame before pouring the babbitt. The surface next to the shaft will then be very smooth and free from surface cracks.—G. GOODRICH, Chicago.

### No. 488—Tool Compartment Over Bench

WASTE of time and energy in machine shop work should be eliminated. Considerable time is wasted in searching for tools that are needed for a certain piece of work and when they are found the bench is usually so cluttered up that it is impossible to accomplish the work in an orderly way. Bench room is valuable and so is time. Walking back and forth to a tool room is not conducive to machine shop efficiency, neither is a cluttered bench. A good plan is to collect all of the tools needed for the day or single piece of work and then stow them away in some convenient place near the bench. A tool compartment, such as is shown in the accompanying illustration, will help solve this problem. This compartment is made from the bottoms of peach baskets with partitions between. Holes are drilled in the top for drills and taps. The lower compartments are used for housing the wrenches, screw drivers, pliers, etc. The whole outfit is supported by two pieces of angle iron which are bolted to the wall. A round piece joining the two pieces of angle iron serves as an axis around which the tool compartment may be rotated.—S. DRAKE, Norristown, Pa.

### Cent Tax in Pennsylvania

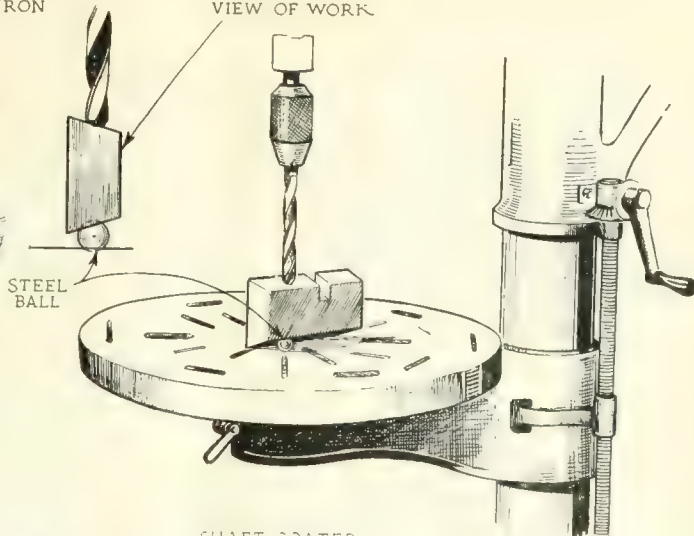
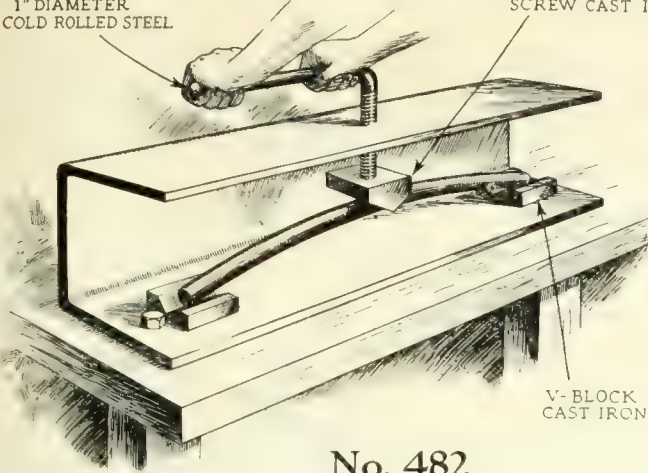
HARRISBURG, PA., June 22—Gov. Sproul has signed the "cent-a-gallon" gasoline tax. This tax affects every sale of gasoline to a consumer in Pennsylvania. More than \$2,000,000 a year will be realized in revenue by the measure's operation. The tax becomes effective on Sept. 1. It is estimated that Philadelphia, for instance, will receive \$350,000 a year as its share, as half the tax goes to the county where collected.



SCREW LEVER  
1" DIAMETER  
COLD ROLLED STEEL

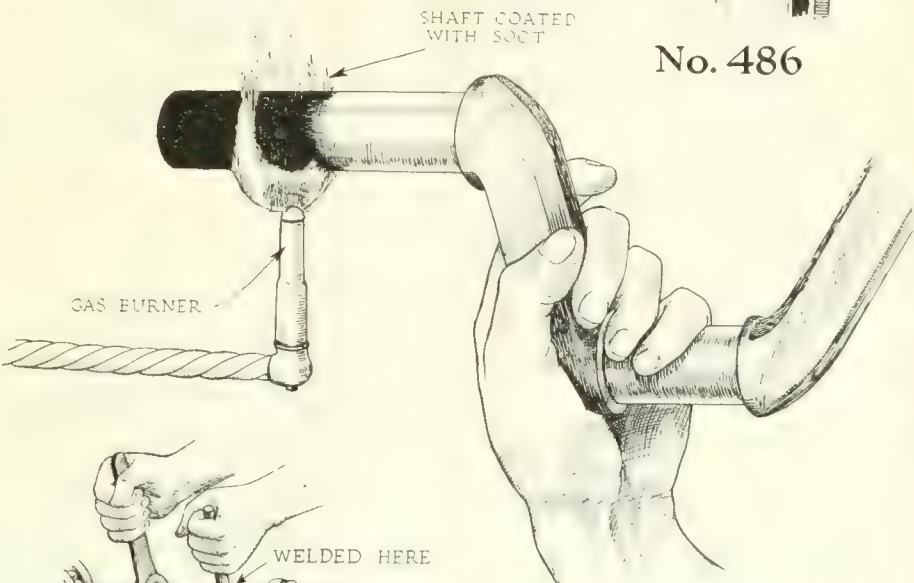
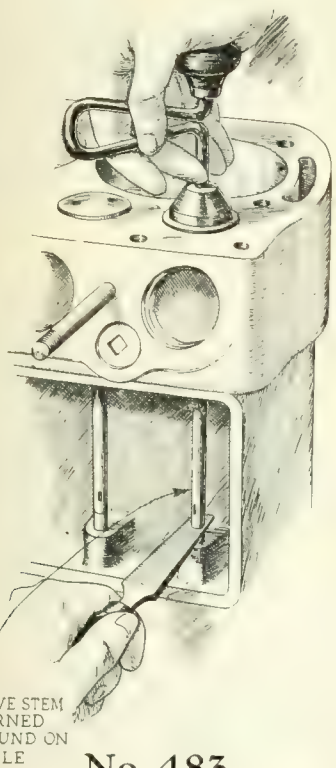
NOSE OF PRESSURE  
SCREW CAST IRON

ENLARGED END  
VIEW OF WORK



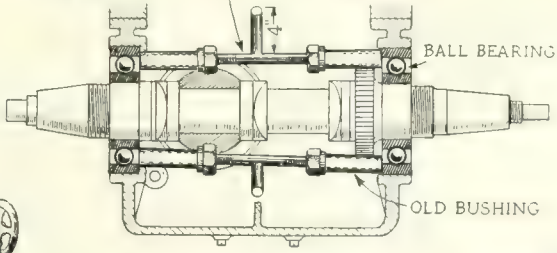
No. 482

No. 486

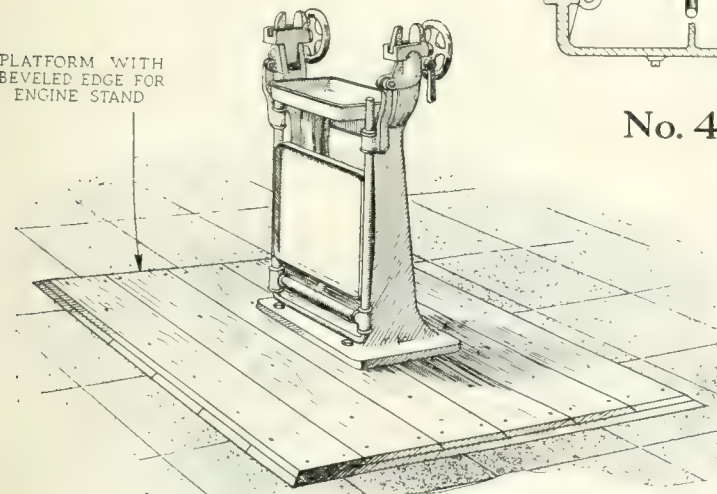


WELDED HERE  
1/2" STEEL ROD 10" LONG

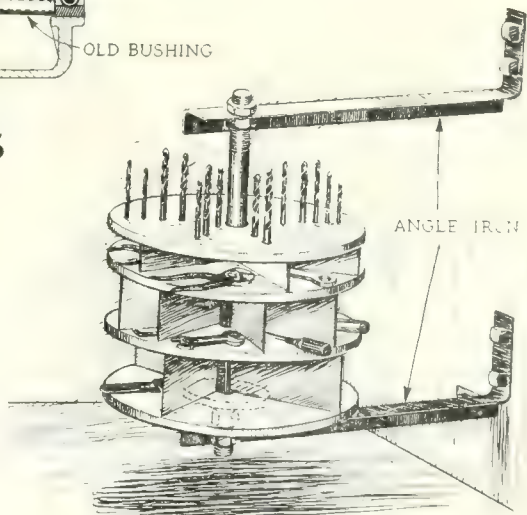
No. 487



No. 485



No. 484



No. 488



### No. 489—Spray Hose to Use with Compressed Air

A TRUCK garage equipped with a compressed air system for the inflation of pneumatic tires also has other opportunities for the saving of time and energy. This is accomplished in the machine shop during the overhauling period and also when the trucks come in caked up with mud and oil.

A sprayer made like that shown in the accompanying illustration will make work easier and more thorough in the machine shop when, for instance, an engine is being cleaned in preparation for a general overhaul. Air pressure combined with kerosene will give a spray forceful enough to dislodge oil and other accumulations. This is especially helpful when getting at inaccessible places. Whitewash with air pressure is a big time saver when the walls of the garage or machine shop are being whitened for the sake of better lighting facilities or otherwise. The force of the compressed air will send the spray of whitewash, when a long tubing is used, to inaccessible places on the walls and ceilings.

This sprayer consists of two pieces of copper tubing of  $\frac{3}{8}$ - and  $\frac{3}{16}$ -in. diameters. The larger tubing is attached to the air hose. Its exposed end is hammered down to form a nozzle. The smaller tubing is soldered to the larger one and is attached to hose, which is dipped into the kerosene, etc.—H. N. STEVENSON, Trenton, N. J.

### No. 490—Clutch Spring Compressor for Fords

COMPRESSION of the Ford clutch spring is often troublesome because of the stiffness of the spring and the inability of the mechanic to get a good purchase. This trouble can be overcome by the use of a compressor made from the Ford front wheel flanges. One of these flanges is cut away so that it may be inserted over the shaft behind the spring. Tightening the bolts draws the plates together, thus compressing the spring.—W. STEINER, Denver, Col.

### No. 491—Repairing Leaks Around Tire Valve

THERE should be no need of discarding an inner tube because of the fact that a leak has occurred around the valve stem hole. A tube that leaks around the valve stem hole may be repaired by vulcanizing a patch over the valve stem hole and inserting the valve stem at another point, reinforcing the tube with a regular valve patch.—W. ANDRESEN, Franklin, Pa.

### No. 492—Parts Wash Rack with Drain

IT is always a good plan to wash truck parts in some kind of receptacle rather than on the garage floor. This works for cleanliness as well as for time saving.

The usual plan is to take some part and then lay it on the floor preparatory to applying a brush and kerosene. The floor, after the cleaning has been accomplished, is then covered with oil and kerosene. A far better plan is to drop the part in some receptacle, leaving it there to soak in kerosene or some other cleaning fluid while other work is being done. Quite often it is possible to soak as many as five or six parts at one time until all of the oil and other accumulations have been entirely washed off. By this method, much of the hand work formerly done, is eliminated and the mechanic is given more time to attend to other work.

A parts wash rack may be made of wood with legs like a table and lined with sheet iron and a sink. The sink is connected by a pipe through the floor to a barrel in the basement. A shut off cock or plug can be used to keep the gasoline or kerosene in the sink. After the kerosene has been used and been drained into the barrel, it is possible to use it again by allowing the oil to rise to the surface and then carefully draining off the kerosene from an opening at the lower end of the barrel.—JOHN KOEHLER, Harrisburg, Pa.

### Be Observant

Whether you are a driver or mechanic, you will find someone that has worked out a way in which to solve some repair job. Emergency repairs happen every day, and if they are successful, it is your duty to pass the good word along.

By doing this you are not only helping others, but yourself as well.

### Your Ideas Are Valuable

### No. 493—Washer Used for a Hammer Wedge

HEAVY use of a hammer often tends to loosen it. A loose hammer should be immediately fixed so as to prevent accidents, etc. A good idea is shown in the accompanying illustration. A washer has been sharpened on one side and then driven in the head. After this has been done, the wood will swell into the hole, thus preventing the wedge working out.—HARRY WHEELER, Mt. Vernon, N. Y.

### No. 494—Ring Squeezer for Tight Places

WHEN truck engines are designed so that the pistons are inserted from beneath the block, trouble quite frequently occurs through lack of sufficient room in which to squeeze the piston rings. The accompanying illustration shows a good device for handling this work. This ring squeezer is operated by an old pair of tinner's snips with the blades drawn to the shape shown, or with a pair of tongs.—F. DAY, Cleveland.

### No. 495—Removing a Stud Without Pipe Wrench

SOMETIMES a stud must be removed and a pipe wrench is not available or cannot be used on account of space restrictions. A positive way to remove or replace the stud is to take two nuts and screw them on the stud. After doing this, lock them tight with a wrench and then pull on the top nut to screw the stud in. To unscrew the stud pull on the lower nut.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.

### No. 496—Magneto Race Puller

IN making this puller, use a  $\frac{3}{4}$ -in. hex nut and ream out to fit the race, as illustrated. A hole in the middle of each side of the hex nut is tapped to fit  $\frac{1}{4}$ -in. set screws which fit in the race. Then bolt a light iron strap to the hex nut. A  $\frac{3}{8}$ -in. cap screw through the closed end of the strap when screwed in gives pulling pressure to the strap which is in turn transmitted to the  $\frac{3}{4}$ -in. hex nut and race. The  $\frac{3}{8}$ -in. cap screw is guided by a  $\frac{3}{8}$ -in. nut screwed on it inside the strap.—H. N. STEVENSON, Trenton, N. J.

### The Story of Motor Oils

THE smallest item of expense in the operation of motor-driven vehicles is lubrication. Yet, no other thing so greatly influences the total cost of operation. The cost of gasoline, the repair bill, satisfaction in driving, the useful life of the vehicle—all are influenced by lubrication, the cost of which is between 1 and 2 per cent of the total, according to the Atlantic Refining Co. in its booklet entitled, "The Story of Motor Oils."

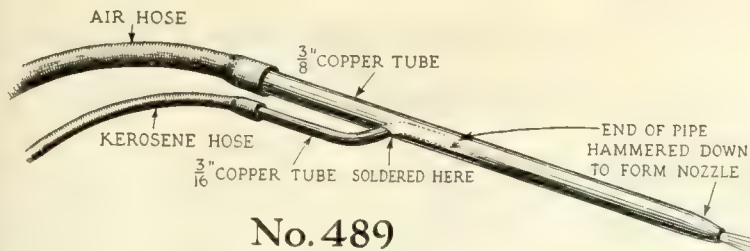
The story was written for the benefit of fleet owners who are ignorant of the laws of lubrication and the influence of lubrication on the operating cost of trucks. The facts contained are not only interesting from an engineering standpoint but they throw a light on some of the things which in the past have been more or less misunderstood.

Viscosity, resistance to heat, stability, purity, resistance to solidification by cold, and the avoidance of carbon troubles are all discussed thoroughly.

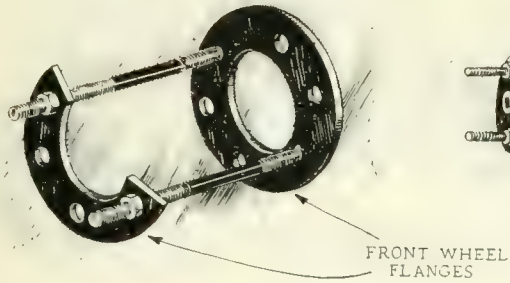
Some very interesting information is given regarding the influence of oils on the consumption of gasoline. Friction in the average engine, it is stated, consumes 15 per cent of the power that gasoline gives. Under favorable conditions this should be reduced to 12 per cent. Power lost due to unconsumed gasoline passing out of the exhaust amounts to 33 per cent. Cooling and radiation losses amount to 40 per cent. In other words, the average engine actually delivers about 12 per cent of its power.

Remedies for the elimination of engine oil dilution are also given in the booklet. Keeping oil consumption down is also discussed.

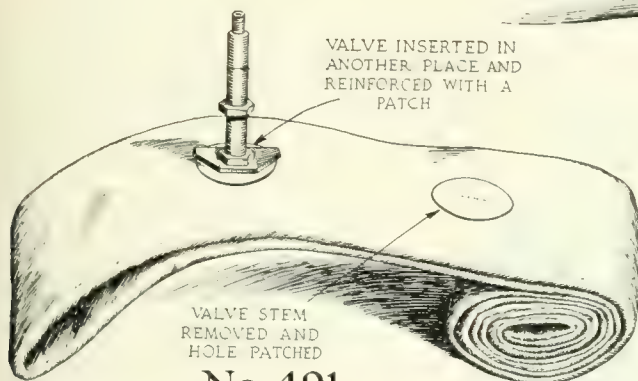




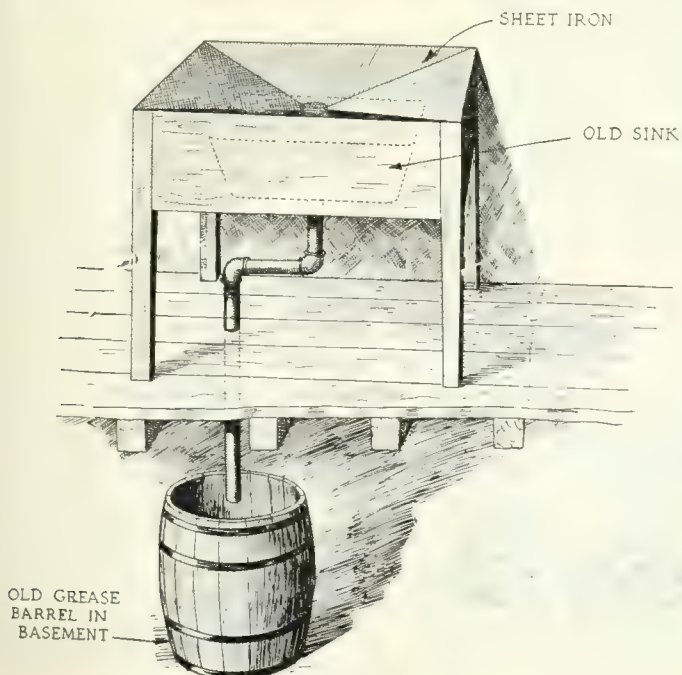
No. 489



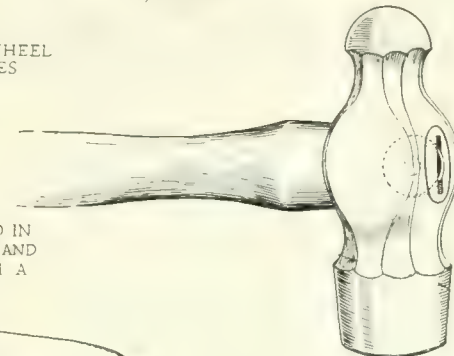
No. 490



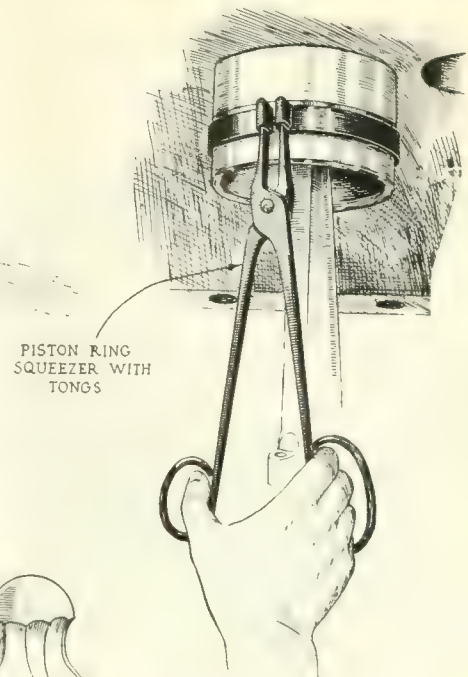
No. 491



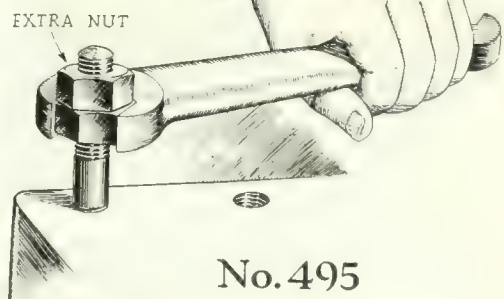
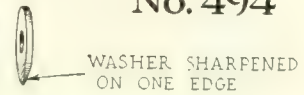
No. 492



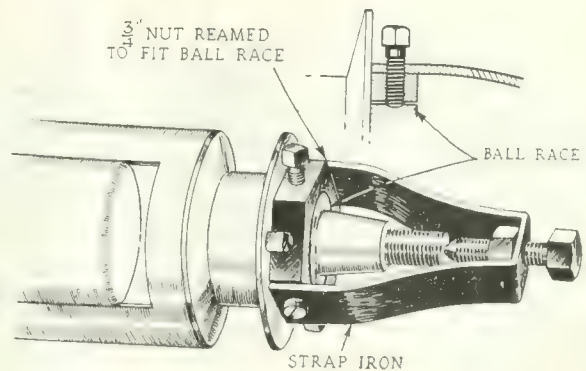
No. 493



No. 494



No. 495

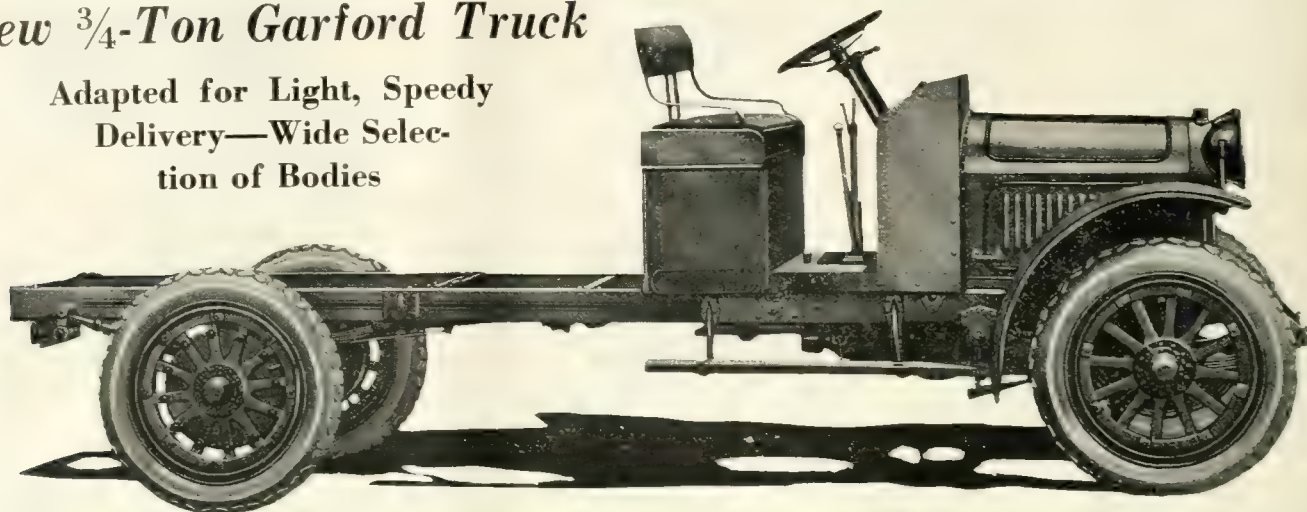


No. 496

# Buyer's Department of The Commercial Vehicle

## New $\frac{3}{4}$ -Ton Garford Truck

Adapted for Light, Speedy  
Delivery—Wide Selec-  
tion of Bodies



### GARFORD SPECIFICATIONS

Capacity, tons	3
Price, chassis	\$1,790*
Tires, front	34 by 5
Tires, rear	34 by 5
Bore, in.	3 3/8
Stroke, in.	7 1/2
Gear ratio in high gear	6.25 to 1
Final drive	Worm
*With Express body, \$1,780; with Panel body, \$1,815	

THE already extensive line of trucks produced by the Garford Motor Truck Co., Lima, Ohio, has been completed by the addition of a new  $\frac{3}{4}$ -tonner. The new truck, known as Model 15, is especially adapted for light, speedy delivery. The general characteristics and features of the heavier Garford types

are embodied in it. The truck has a normal speed of from 25 to 30 m.p.h. No governor is used.

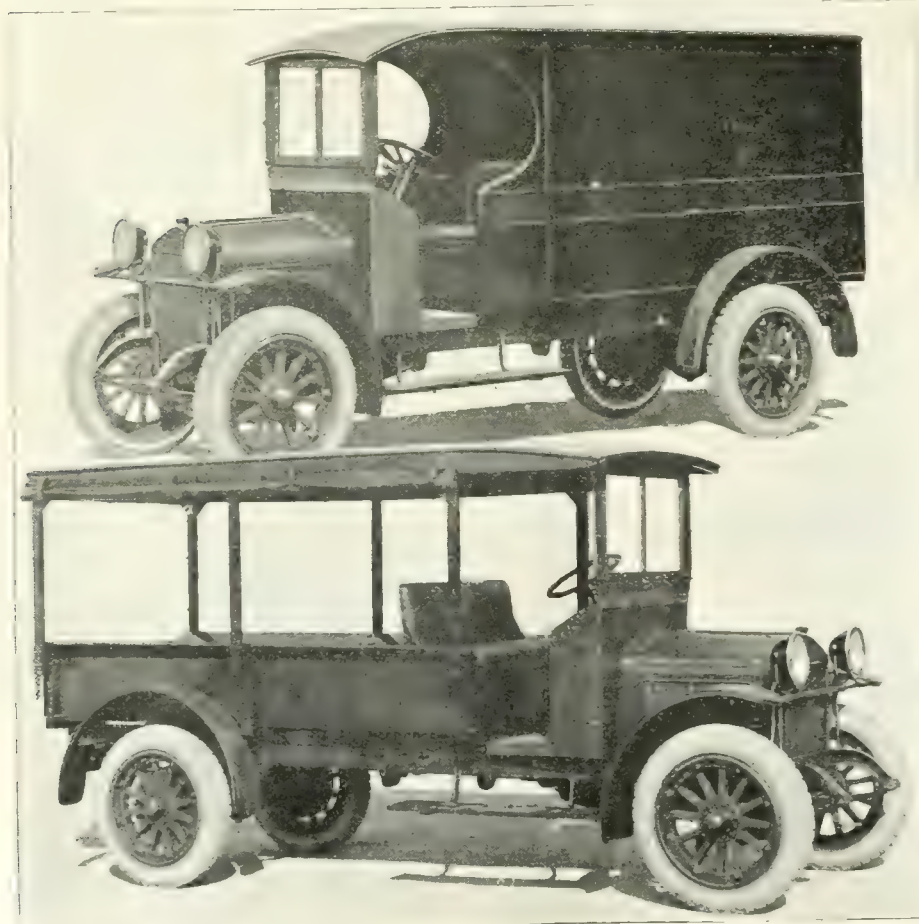
This company is producing bodies for this chassis, that of foremost mention being the flareboard express with standing top, removable type of curtains and built-in windshield and the full panel type with built-in windshield. The body dimensions are as follows: Express, length 96 in., width 44 in., height of panel 14 in. and width of flareboard 5 in.; Panel, length 96 in., width 42 in and height 54 in.

The body and miscellaneous allowance is 1,000 lb. The wheelbase is 132 in. The length of frame back of the driver's seat is 96 in. The length from the dash to the center of the rear axle is 104 in. The length from the rear of the seat to the center of the rear axle is 61 in.

Equipment includes two electric headlights, one electric rear signal lamp, one electric dash lamp, jack, tool set, mechanical horn, oil can, electric lighting starting system using a standard 6-volt, 90-amp. battery, air pump, and speedometer. The tire pump is bolted to the left side of the gearset, the gearshifting device being accessibly located. Fifteen feet of air hose with a special thumb lock valve connection is included in the equipment.

The new model is assembled from well known units, including the following: Buda four-cylinder engine, Long radiator, Stromberg carburetor, Borg & Beck clutch, Timken front and rear axles.

The service and emergency brakes are of the internal-expanding type, operating independently on the rear wheels. Both sets of brakes are equalized. The springs are semi-elliptic both front and rear. The front springs are 40 by 2 1/4 in., the rear 50 by 2 1/4 in. Control consists of a foot accelerator, spark and throttle levers on the steering column brake and gearshift levers in the center of the chassis.



Two of the bodies produced by the Garford company for its new  $\frac{3}{4}$ -tonner



# Buyer's Department of The Commercial Vehicle

## 1-Ton Stewart Speed Truck

**New Buda Model MU Engine  
Used—Removable Cylinder Head**

### STEWART SPECIFICATIONS

Capacity, tons	1
Price	\$1,875
Tires, front	35 by 5
Tires, rear	35 by 5
Bore, in.	3 3/4
Stroke, in.	5 1/4
N.A.C.C. h.p.	21.08
Speed, m.p.h.	40
Final drive	Int. Gear

THE Stewart Motor Corp., Buffalo, N. Y., has bought out a new 1-ton speed truck, the principal features of which are, gasoline efficiency, tire mileage, and hill climbing ability. The new model, it is stated, easily negotiates 22 per cent grades with capacity loads. It shows an average of 14 to 16 m.p.g. and a speed of 40 m.p.h. with capacity load. The new Stewart model is distinguished particularly by its new power plant. The engine used is the new Buda model MU, which has been designed for speed truck work. The cylinder head is removable.

Ignition is through an Eisemann high-tension magneto. Carburetion is taken care of by the new model Zenith carburetor, which is adjustable with a hot-spot quick starting device.

The gasoline is fed to the carburetor by gravity from a 16-gal. round type of tank which is made of terne-coated steel to prevent rusting and corrosion. The tank is supported on malleable iron brackets under the seat.

Engine lubrication is through full force pressure feed to the crankshaft, camshaft, and connecting rod bearings. The chassis lubrication is effectively secured through the Alemite system. Water is circulated by a centrifugal pump having a large bronze runner.

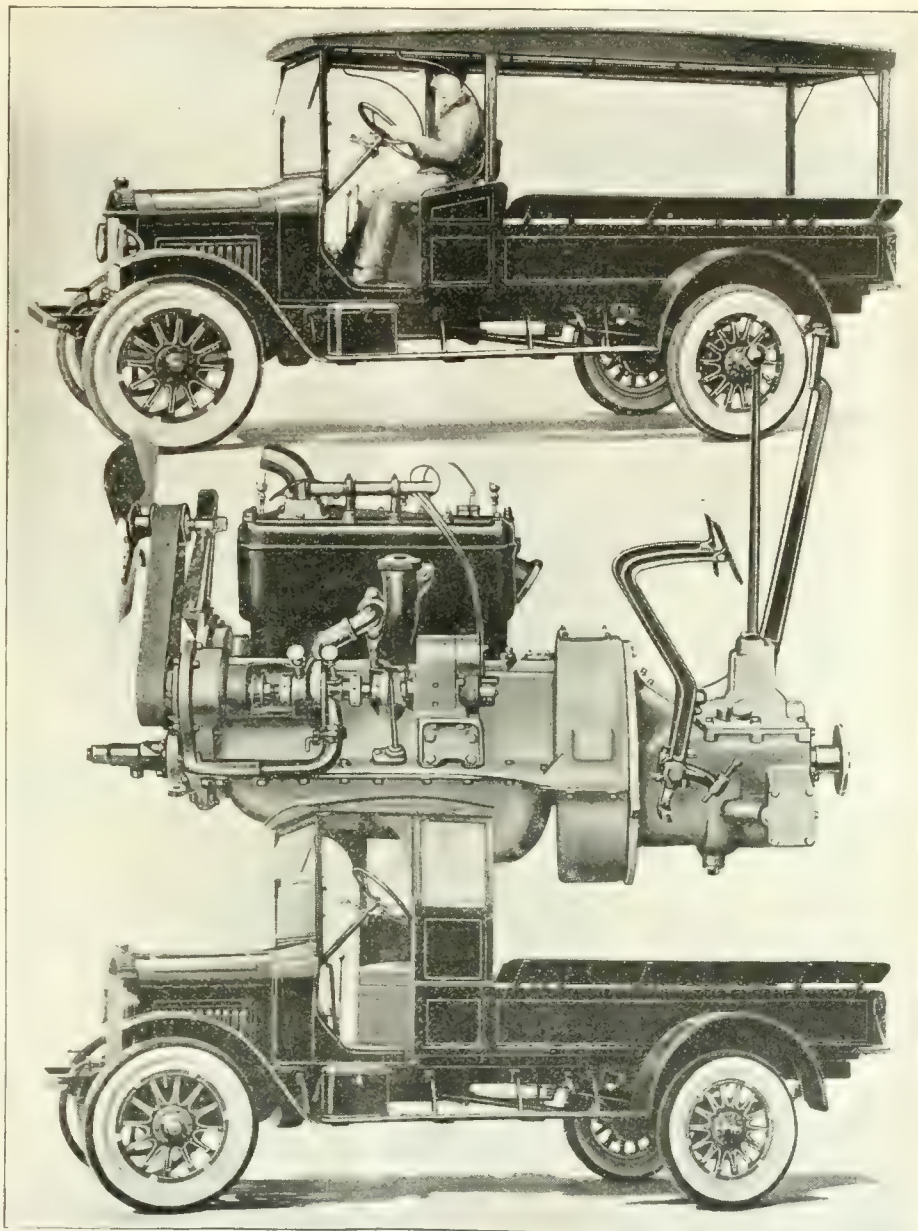
The 5-gal. radiator is of the cast iron armored type with vertical tubes.

The clutch is of the dry-plate, multiple-disk type, with one set of steel plates and another set of steel disks lined with moulded clutch facings.

The engine, clutch and gearset are mounted as one unit on three-point suspension. The shafts are mounted on annular ball bearings.

The transmission gear shifter fingers are made of .20 carbon steel and are case-hardened to prevent wear.

The rear axle is of Clark internal-gear-driven design, the same as has



Views of the new Stewart 1-ton model and the Buda engine

been used on Stewart models for several years. It is geared 6.75 to 1 so the total reductions from engine to rear wheels are as follows:

High	6.75 to 1
Intermediate	11.48 to 1
Low	27 to 1
Reverse	30.38 to 1

The frame side rails are 4½ in. deep and 2¼ in. wide. The thickness of the steel used is 3-16 in.

The front and rear springs are of the semi-elliptic type, 41 by 21 in. and 54 by 2, respectively, equipped with full length rebound plate. Each spring is made of special grade silico manganese alloy steel, heat-treated for flexibility and long life, equipped with bronze bush-

ings working on hardened steel pins, and equipped with the Alemite high pressure lubricating system.

The truck is equipped with 35 by 5 cord tires all around. The regular equipment consists of electric headlights, with legal lenses and dimming device, electric tail light, tool box, 111-hr. Willard battery, tools, jack, horn, oil gage, and armature. The chassis is painted red, the fenders and runningboard black.

The price of the chassis complete with the above equipment is \$1,875, plus war tax, f.o.b., Buffalo. The new model will take an open or covered express body, panel, stake or special farmer's grain type of body. The starter costs \$50 extra.



# Buyer's Department of The Commercial Vehicle

## Empress High Pressure Lubricating System

This system provides a positive, quick, easy and clean method of lubricating a truck. One hand operates it and the system handles all grades of grease or oil.

Pressure or gravity feed may be had. Pressure as high as required is developed in the gun before applying the gun to the connection installed on the bearing. Then as the gun nozzle is thrust into the connection the pressure is released and the resulting explosive action instantly flush the bearings with a charge of the lubricant forced in under high pressure.

The explosive action by which the lubricant is forced into the bearing effectively cleans it. All dead grease and dirt which may have accumulated is driven out before an instantaneous flooding of the bearing.

When grease is used as a lubricant it is always forced into the bearings under pressure, the gun being conveniently carried in the tool box. If oil is used, the gun is not carried in the box, the connections being filled from the ordinary oil can as lubrication is required.

There are no connections to be made and disconnected each time the lubricant is applied. The system consists of one gun and three different types of dust-proof connections. These connections are made up as follows: Straight connection, 45 deg. elbow connection and 90 deg. elbow connection. All three connections are furnished in a large number of different threads to fit any truck. Adapters are also furnished where necessary to use the connections on spring bolt head and other places. For places where the lubricant is apt to throw out, due to centrifugal force, the connections are fitted with a ball check valve.

The connections are made with a revolving cap for convenience in lubricating, making it possible to operate from any position. The maker is the Bowen Products Corp., Auburn, N. Y.

## Seric Truxseats

THESE truck seats are scientifically made, employing principles evolved through close observation. They absorb shock through a strong adjustable coil spring. There is no creep nor will the springs weaken through use. The rods connect to the adjustable spring, and the hooks are shrunk to the torsion rods and are made of the toughest steel.

Adjustment for drivers weighing from 150 to 250 lb. can be made instantly by turning the nut on the coil spring. This coil spring takes the first shock; the steel rods communicate it to the hooks and links, and the driver feels none of it. There is no sidesway. The driver's weight is distributed over the whole area of the seat and shock is thereby eliminated.

## Truck Accessories

When required, Seric seats are made with backs. Three standard sizes are made as follows: 16 by 18 in., 16 by 20, and 16 by 24. The retail prices in quantities of ten to twenty-five are \$9.15, \$9.45, and \$9.95 f.o.b. Racine, Wis., plus 3 per cent war tax. In quantities of one to nine the prices are \$10.45, \$10.80 and \$11.35. The maker is the Seric Mfg. Co., Racine, Wis.

## A-Gah-Co Warning Signal

THIS is a manually operated horn. It has adjustment for regulating the tone and for taking up any wear. The bracket is long, and is secured at two points to prevent rattling. A special bracket is furnished for use on Ford trucks. The finish is black enamel with nickel trimmings. The price is \$4.50. The maker is the A-Gah-Co Auto Horn Co., 167 Oliver Street, Boston.

## Liberty Tire Pump

THIS is a runningboard pump giving power and ease of operation. It is said by the maker that these pumps are tested to upwards of 200 lb. pressure. The Liberty pump has a seamless cylinder stamped from one solid disk of steel. A self-acting valve prevents leakage. A compound leverage (produced by the peculiar construction of the operating lever or handle) increases the power of the stroke progressively as the air pressure increases. This makes each stroke progressively easier toward the end of the stroke. A leather washer covers a wooden disk saturated with vaseline, which operates to keep the leather soft, pliable and in good working condition. The clamps by which the pump is attached to the runningboard are permanently attached to the pump. The maker is Reece-Hilton, Inc., Troy, N. Y.

## Gripper Belt for Ford Fans

THIS belt, it is stated, cannot slip or break and never needs tightening. It is made of coiled wire. It is never rigid and eliminates all tension on the pulleys. It can be applied in 10 min. with a screw driver. The price is \$1 and it is made by the Dyer Co., Cambridge, Mass.

## Neo-Lite Rear Signal

THE Federal Signal Co., Albany, N. Y., has recently developed and produced the Neo-Lite signal for the protection of trucks against rear end collisions by giving timely warning to the

drivers of trucks following. This signal is adapted for mounting on the rear end mudguard or any one of several other locations and is controlled from the driver's seat by means of a push button. A rich orange-red outline of a hand against a dull background is shown. The source of electrical energy is a small induction coil. In operation the primary circuit consumes about ½ amp. from an ordinary 6-volt battery.

## Rummell Spark Plug

THIS plug uses the "775" insulator which contains an internal spark gap. This gap is non-adjustable and fool-proof and in a small air-tight compartment where it will not corrode. In this compartment there is no abnormal pressure, therefore, it offers no resistance to the electrical current when passing through the plug. By the use of the gap the electrical current is built up to such a pressure or voltage that it jumps the firing points with an intensity that overcomes the resistance of the compressed gases and oil. This action, it is stated, eliminates carbonizing, arcing and burning away of the firing points. It also overcomes the difficulty in starting a cold engine. The maker is the Rummell Mfg. Co., Findlay, Ohio.

## Model C Auto Reelite

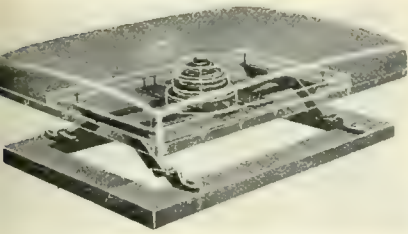
THE model C is a new model with a single shell lamp. It has the extension trouble light feature. The finish is black enamel with nickel trimmings. The switch is conveniently mounted on the handle. The prices are as follows: Model C-6, 6 in. diam. 20 c.p. lamp—\$9; model C-7, 7 in. diam., 27 c.p. lamp—\$10; mirrors for models C-6 and C-7—\$1; model SC-7, all nickel finish—\$15. All models are furnished with 6, 12 or 18 volt bulbs as ordered. The maker is the Anderson Electric Equipment Co., 154 Whiting Street, Chicago.

## Pierce Governor for Fords

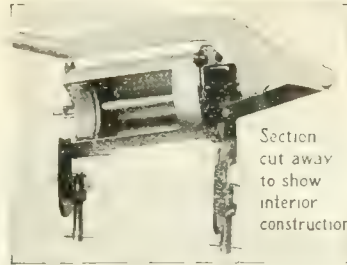
THE governor proper bolts to the front gear cover of the engine in such a position that the fan belt furnishes the power for driving the governor pulley. The pulley is attached to the end of a shaft that runs on radial ball bearings. Attached to this shaft is a spider which carries two weights which are thrown outward as the speed of the engine increases. The governor arm is connected to the regular hand throttle rod by a system of rods, and ball and socket joints. The governor may be set by means of the throttle to hold any engine speed. It is not necessary to drill any holes nor are any special tools needed to install this device. The maker is the Pierce Governor Co., Anderson Ind.



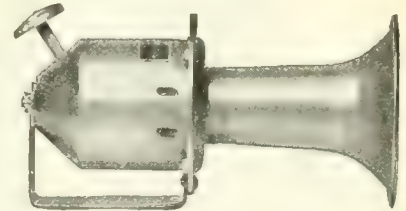
# Buyer's Department of The Commercial Vehicle



*Serie Truescet*



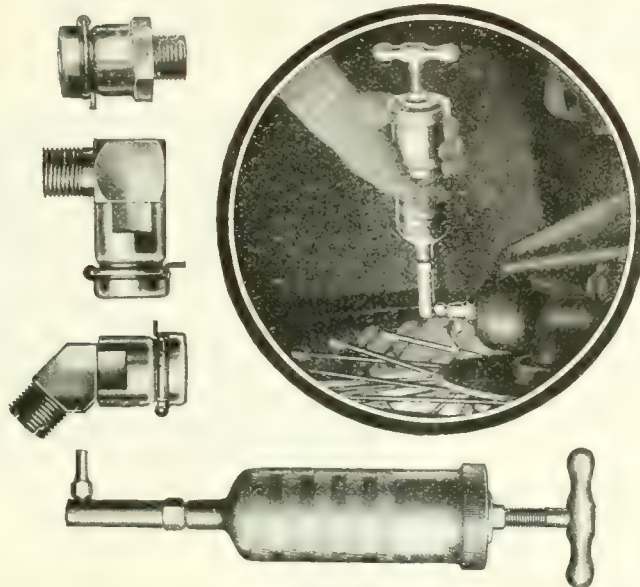
*Liberty Tire Pump*



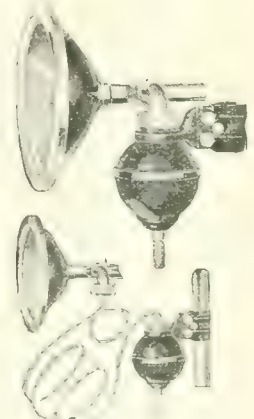
*A-Gah-Co. Signal*



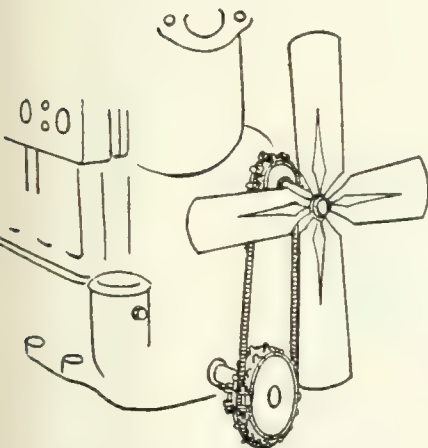
*Rummell Spark Plug*



*Empress Lubricating System*



*Auto Reelite*



*Gripper Belt for Ford Fans*



*Pierce Governor for Fords*



*Neo-Lite Rear Signal*

# Buyer's Department of The Commercial Vehicle

## Universal Crankshaft Aligner

A DEVICE for aligning connecting rods and supporting any make or size of engine crankshaft so that the connecting rod bearings can be fitted and the rods and pistons tested for alignment has recently been placed on the market by the H & H Machine Co., St. Louis, Mo. One of the most important operations in connection with the assembly of an engine is proper fitting of the bearings and making sure that pistons and connecting rods are lined so that the pistons will travel parallel with the cylinder bore and that the piston pins are in line with the axis of the crankshaft.

A device such as the one shown in the illustration will insure proper alignment before the assembly is completed and will prevent the necessity of taking the engine down again as is often the case where the alignment is not tested. The illustration shows the method of making the test. Note that each piston is squared on its own bearing which assures proper alignment after assembly in the engine. The universal crankshaft fixture complete with stand and one mandrel sells for \$60. The extra mandrels sell for \$3.75 and the B & S combination square for \$3.90.

## Ainge Oscillating Valve Grinder

THE center shaft of this tool is made of a bar twisted so that the movement of the sliding handle from top to bottom oscillates the valve through twelve complete quarter turns. It is light in weight and ruggedly constructed. A coil spring for lifting the valve off its seat is provided with each tool. The price is 2.50.

The maker is the George H. Ainge Tool, Die & Machine Works, Springfield, Ohio.

## C-O Drill

THIS drill is for light work and has a self-feed and changeable speed. It bores 0 to  $\frac{3}{4}$  in. and drills to the center of a 12-in. circle. The up and down run of the spindle is  $2\frac{3}{4}$  in. It takes bits with  $\frac{1}{2}$ -in. shanks. The net weight is 70 lbs. The light wheel rims can be drilled by removing the table and using a formed support as a wheel-holder. The maker is the Canedy-Otto Mfg. Co., Chicago Heights, Ill.

## Broach Well Keyway Set

THE Velco Mfg. Co., Greenfield, Mass., has developed a new broaching tool that will be of interest to truck repairmen and any establishment where keyways are cut and where the nature of

## Shop Equipment for Fleet Owners

the work does not require a broaching machine.

Known as the Broach Well Keyway Set, the tools are grouped in convenient sizes and used in connection with the ordinary arbor press, will cut a wide range of keyways. By the use of extra broaches which are furnished at slight added cost, keyways of special shape such as dove-tail and half-round, may be cut. The method is very simple and the tools are rugged in design. A tool steel broach or cutter, having the Velco patented tooth, is guided in an accurately sized bushing which adapts the cutter to the desired bore. The keyway is cut by placing the bushing beneath an arbor and pressing the broach through the work in exactly the same manner that an arbor would be removed. The entire operation, it is stated, requires less than 1 min.

## McClarran Pinion Puller

THIS puller was designed especially for removing the pinion from the drive-shaft without damage to the pinion, bearing or shaft. It is made of cast steel and is guaranteed for 1 year. It is also guaranteed to pull the hardest pinion without damage. The price is \$5. The maker is the McClarran Motor Car Co., Greensburg, Pa.

## Shear Attachment for Pliers

IT is said that this tool can be attached to either slip-joint or combination pliers in 2 sec. or less. The tool steel blades are  $\frac{1}{4}$  in. thick and  $2\frac{1}{2}$  in. long. It cuts medium gages of all the common metals. The maker is the Waterloo Specialty Mfg. Co., 102 East 5th St., Waterloo, Ia.

## Caldwell Tire Remover

TIME saving in pneumatic tire removal is the idea back of the design of the Caldwell device. It is a solid casting weighing 300 lbs.; has a machined-channel, 37 by 5 in., in which a heavy air tube works, pushing a wooden core with equal pressure against the inner circle of the tire at the bead, forcing the tire from the rim seat. During the process the rim is held firmly in place by a 30-lb. spider. Five minutes is all that is necessary to remove any size of tire from any make of wheel or rim, straight sides. The maker and distributor is the Caldwell Motor Accessories Co., 408 N. Central Avenue, Knoxville, Tenn.

## Dyer Bushing Extractor

THIS tool is a time saver in the garage when repairing Fords, Dodges, and other small vehicles. It quickly and easily performs the difficult job of removing old bushings in the steering knuckle, spring, spindle arm and spindle body. In operation, the arms are squeezed together with pliers and inserted in a bushing, as shown in the accompanying illustration. The tool is then driven in after which it will expand after passing the first bushing and seat on the edge of the other. A few taps of the hammer will knock this bushing out. The Ford spindle arm and spring bushings are easily driven out with the shoulder and as easily driven in place. The extractor is made from tool stock, hardened and polished. It is heat-treated. Its length is 9 in. The maker is the Dyer Co., Cambridge, Mass.

## Goodell-Pratt Valve Grinder

THE back and forth movement necessary to obtain a perfect valve seat is caused by a simple mechanism actuated by a continuous rotation of the crank on this grinder. The cast iron casing in which the working parts are inclosed for protection gives to the tool sufficient weight so that no additional pressure is needed to accomplish the best results. Both an adjustable spanner and a blade are provided in order that the tool can be used on any type of valve. The length over all is  $10\frac{1}{4}$  in. The weight is  $3\frac{1}{4}$  lbs. The price is \$5 and the maker is the Goodell-Pratt Co., Greenfield, Mass.

## Milwaukee Rim Tool

DUE to the rigidity of this tool it cannot be designed in a collapsible state and is therefore primarily intended for garage and service station use. It has a range to take in all sizes of rims for motor vehicles as well as the pneumatic type of rim and it is claimed will open any split type rim. In opening a rim with this tool the entire rim slides around the prongs which hold the rim on the tool, thus preventing the rim from being pulled or twisted out of shape. It is manufactured by the Milwaukee Pattern & Mfg. Co., Milwaukee, Wis.

## Zip Grinding Compound

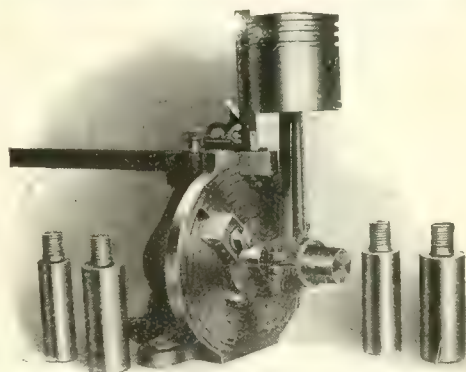
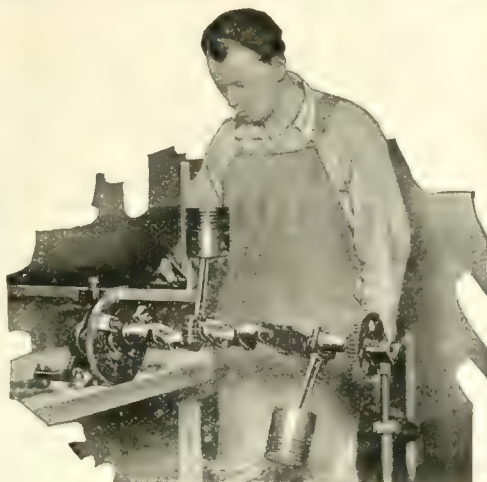
ZIP valve grinding compound is claimed to reduce valve grinding. It is a mixture of a hard, sharp abrasive with a non-lubricating chemical binder, contains no glass, grit emery or lubricants, and works with water. It is claimed to be non-freezing, non-drying and economical. The maker is the Zip Mfg. Co., Denver, Col.



# Buyer's Department of The Commercial Vehicle



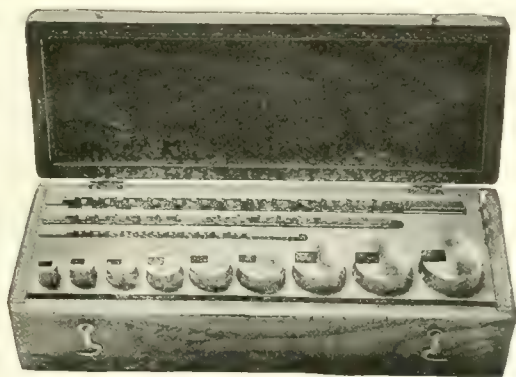
Milwaukee tire tool



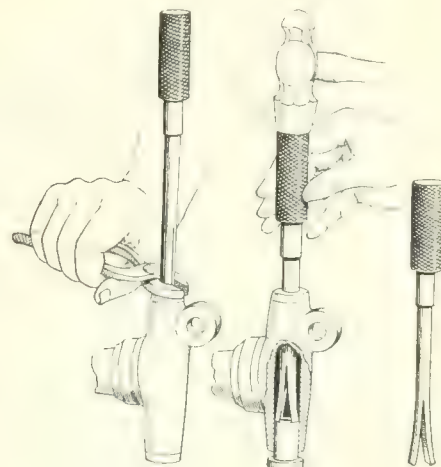
Left and above—H & H Universal crankshaft support and aligning fixture, showing method of making test



Goodell-Pratt Valve grinder



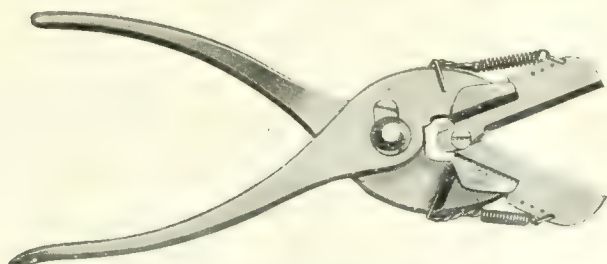
Broach well keyway set



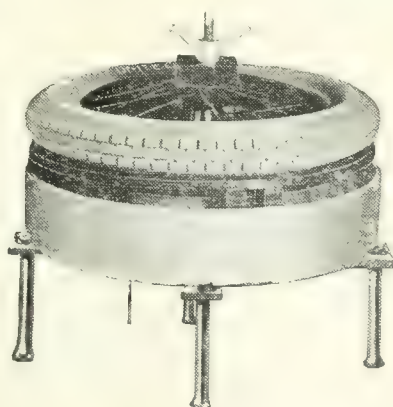
Dyer bushing extractor



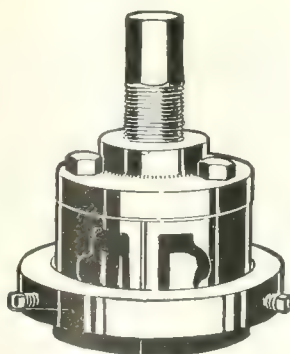
Ainge valve grinder



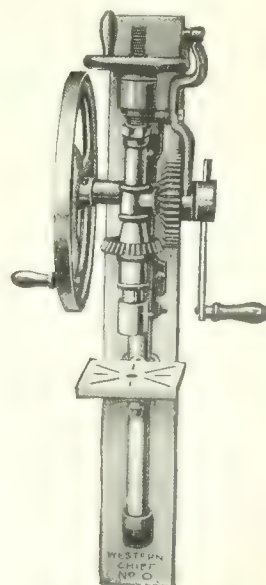
Shear attachment for pliers



Caldwell tire remover



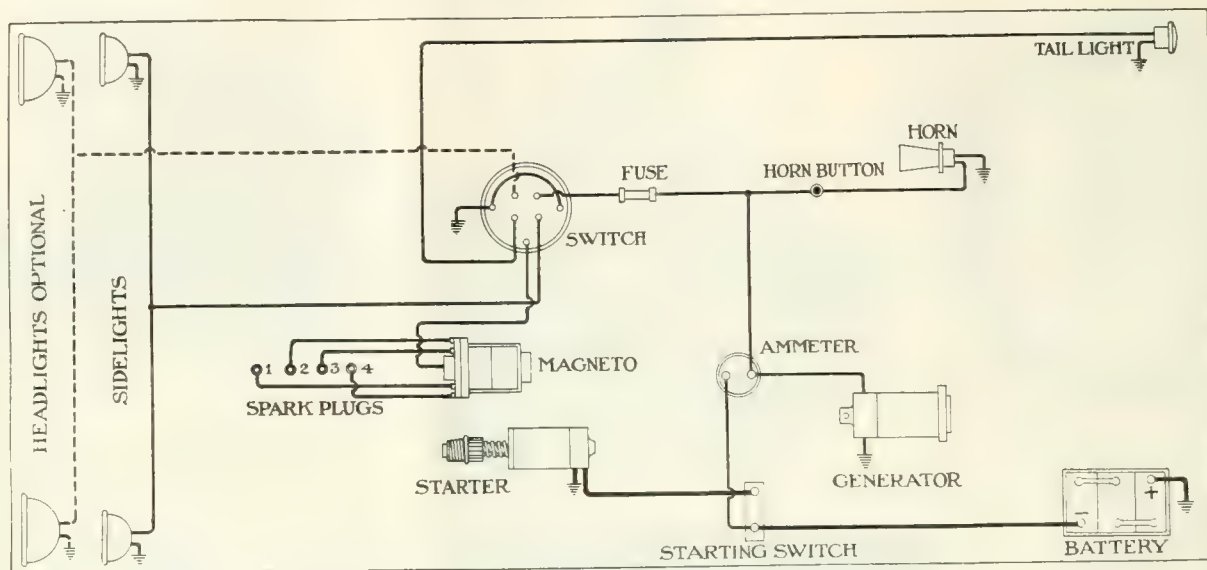
McClarren pinion puller



C-O drill

# Motor Truck Electric System Wiring Diagrams

## 26—Starting and Lighting Unit on Parker Trucks



This shows the starting and lighting wiring diagram used on the Parker 2, 3½ and 5-ton models. The generator, switch, ammeter, fuse block, starter and starting switch are of Westinghouse design. Other equipment includes a Bosch magneto and Willard battery

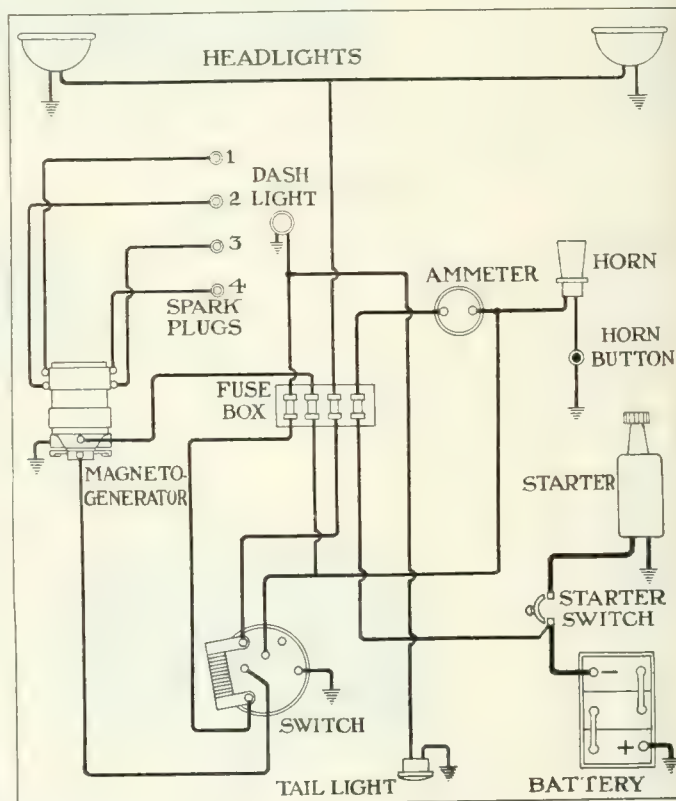
### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE:

1920	
1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting .....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting .....	Dec. 15
1921	
12—Maxwell, Lighting .....	Jan. 15
13—International, Starting and Lighting....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 15
17—Reo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Apr. 15
19—Stewart, Starting and Lighting.....	May 1
20—Kelly-Springfield, Starting and Lighting.....	May 15
21—Riker, Starting and Lighting.....	May 15
22—U. S. Starting and Lighting.....	June 1
23—Wilcox, Lighting.....	June 1
24—Pierce-Arrow, Starting and Lighting....	June 15
25—Republic, Starting and Lighting.....	June 15
26—Parker, Starting and Lighting.....	July 1
27—Noble, Starting and Lighting.....	July 1
28—Oneida, Starting and Lighting.....	Next Issue
29—Oshkosh, Starting and Lighting.....	Next Issue

## 27—Starting and Lighting Unit on Noble Trucks



The wiring diagram for starting and lighting on all Noble truck models using the Eisemann magneto-generator





# The Fleet Owners' Forum

## Heating of Pistons Will Not Give Sufficient Expansion

To the Editor COMMERCIAL VEHICLE:

What is your opinion in regard to the following method of fitting pistons? I am planning to rebore the cylinder, heat the same old pistons, expanding them, turn them in a lathe to true them up and then use them in the rebored cylinder again?—R. W., Rahway, N. J.

Your method will not prove satisfactory because in the first place, if the block is being rebored for the first time about 0.010 in. of metal will be removed. As a result, it will be impossible to get enough expansion to make up for this difference in the size of the cylinder bore and after the piston is ground true the clearance will be very much too large. It is important that the piston and rings fit properly if the engine is to operate efficiently and, therefore, it is a poor investment to have the job done unless accurate methods are used.

## Squaring the Piston During Assembly

To the Editor, COMMERCIAL VEHICLE:

I have often heard mechanics talk about squaring the pistons in assembling the engine. Just what does the term mean?—READER.

Squaring a piston in assembling an engine is intended to make the piston work perfectly straight up and down in the cylinder. This operation starts from the crankshaft.

The crankshaft and the base of the cylinder must be perfectly in line and perfectly parallel.

The connecting rod is fastened on one end to the crankshaft, and on the other end to the piston. If the connecting rod is perfectly straight, then it must naturally follow that the piston will work perfectly straight up and down in the cylinder, but if the connecting rod is even slightly bent, or is pulled slightly tighter on one side than on the other, it will cause the piston to bear at the top on one side, and at the bottom on the other side, causing the engine to be sluggish, preventing the rings from properly holding compression, and if enough out of square, will cause the piston to seize.

The proper way to perform this operation is to place a square, with its base resting on the top of the crankcase, and its side against the piston, to determine whether the piston rests straight against the square on both sides. If there is a tendency for the piston to touch the square at the top, but not at the bottom

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

on one side, it will be noticed that on the opposite side it will touch at the bottom but not at the top. It is then necessary to bend the connecting rod slightly until the piston touches the square perfectly on both sides.

Many times the question comes up about squaring pistons. The layman naturally assumes that the pistons were square when the engine was taken down for repairs, and that if the wristpin holes are at right angles with the piston walls, it will be square when reassembled. This is not the case. There are different ways of changing the condition without any fault of the piston.

First: When taking the block off, with

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

the pistons and rods still connected to the crankshaft, it is not only possible but very probable that one end of the block will be raised slightly higher than the other, which will very slightly bend some of the rods. This makes it impossible for the new pistons to be square when installed.

Second: In scraping new or old bearings, one end may be scraped slightly more than the other. This means that the rod will be slightly at an angle, preventing the piston from being square.

Third: On a four-bolt connecting rod, the two bolts on one end may be tightened more than the other end.

Fourth: In putting the block back with the pistons and connecting rods attached to the crankshaft, unless the block is lowered evenly there is grave danger of bending the rod, which will put the piston out of square.

All these points must be carefully observed, as the squaring of the pistons is one of the most vital points in assembling an engine.

## Reasons for Ford Cut-Out Failing to Close

To the Editor, COMMERCIAL VEHICLE:

The third brush generator on my 1920 Ford acts as follows: Most of the time the cut-out will not operate until it has been closed manually. It then remains closed and the generator charges normally until the engine is stopped, at which time the cut-out opens. Occasionally the cut-out will cut in when the engine is started, but not often. Decreasing the tension of the spring on the cut-out lever does not help matters. Can you explain what is the matter?—H. JULIAN, Pittsburgh, Pa.

There are two windings on this cut-out, a coarse and a fine. The fine one is connected to the generator on one side and grounded on the other. Immediately the generator starts, a faint current is set up on this winding which, as it finally becomes strong enough, causes the iron core of the cut-out to become magnetized and attract the armature—the small swinging part which carries the contact points.

As soon as these are closed the current flows around the coarse winding and out to the battery by way of the amature. Should the fine windings be broken or become loose at its ground connection there will be no path for the initial current and consequently the cut-out will not close. Upon closing it manually current will flow through the coarse winding and, magnetizing the cut-out core, hold the armature until the engine is stopped.

Sometimes the engine vibration will cause the points to be brought together. When this occurs, of course the heavy winding becomes active just the same as though the points had been closed normally or by hand. Then again, should the fine winding be broken but the wire ends not widely separated, vibration will cause them to touch intermittently. Either of the foregoing would account for the cut-out working satisfactorily once in a while. A test of the fine winding will locate the trouble. A diagram of the cut-out is shown in the accompanying illustration on opposite page.

## Oversize Rings and Compression Loss

To the Editor, COMMERCIAL VEHICLE:

What is your opinion in regard to the use of new oversize rings in preventing a loss of compression?—H. OHL, Jacksonville, Fla.

New rings in an engine will not always prevent loss of compression. New rings will sometimes cause an improvement



that is of very short duration. If a cylinder is worn larger in the ring travel than at the open end, it is impossible to fit an oversize ring in a cylinder.

The rings must go in at the open end, and if this end is not worn, only standard size rings can be put in. Mechanics sometimes use rings a few thousandths oversize and file the ends until the rings fit into the cylinder. When these get up to the point where the cylinder is worn, they open up and cannot possibly assume the shape of the worn cylinder, because they have not been ground to that shape or size. If the cylinder is oval, no round ring can fit it.

A ring cannot be ground to an irregular shape such as a cylinder gets through wear.

### Weight Restrictions in Michigan

To the Editor, COMMERCIAL VEHICLE:

I would appreciate any information on the size and weight restrictions that have been placed on trucks in the state of Michigan. Have any restrictions been made as to the number of trailers that may be used?—H. ROBINSON, Buffalo.

The laws of Michigan state that the gage of motor trucks and trailers are limited to 75 in., measured from center of tire to center of tire. The overall width is 96 in., the overall height is 12 ft. 6 in. and the aggregate length of combination of vehicles is 60 ft.

Weight restrictions consist of 700 lb. maximum load for a tire 2 in. wide, up to 3200 lb. for a 7-in. tire on a wheel of 32 in. in diameter. These maximums are greater for wheels of larger diameter, those for 44-in. wheels being 1.6 larger. Only two trailers may be used.

### Wants Clutch Specifications of Gramm-Bernstein

To the Editor, COMMERCIAL VEHICLE:

Please give me the outside and inside diameters, as well as the thickness and number of pieces of the disk facing used in the 1917 one-ton Gramm-Bernstein truck. I would also appreciate the dimension of the brake lining used in the same truck, including the number of pieces.—READER.

The outside diameter of the disk facing in your clutch is 8 3/4 in. The inside diameter is 6 3/4 in.; the thickness is 1/4 in., and the number of pieces used is ten.

The width of the brake lining is 2 in.; the thickness is 3/16 in.; the length 18 in., and the number of pieces, eight.

### Know the Laws

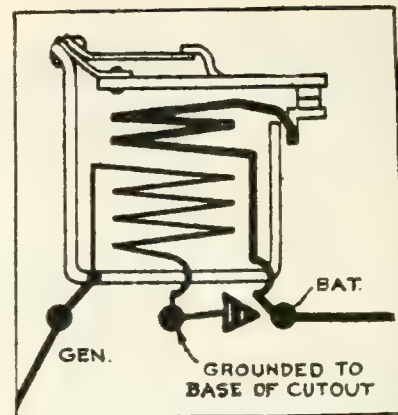
FLEET owners are often forced to send their trucks on long distance runs through three or four states. Unexpected emergency calls come in and quite often the shipper pays little attention to the fact that the laws in these states may differ from his own. Weight restrictions should all be known, as should other truck laws.

### It Will Pay

### Trucks Eligible for Rediscount According to Ruling

To the Editor, COMMERCIAL VEHICLE:

I would like to know whether a ruling has ever been passed by the Federal Reserve Board making motor trucks owned by a transportation company eligible for rediscount after they have been discounted by the seller.—F. E. S., Detroit.



Ford cutout, showing the fine shunt winding in detail

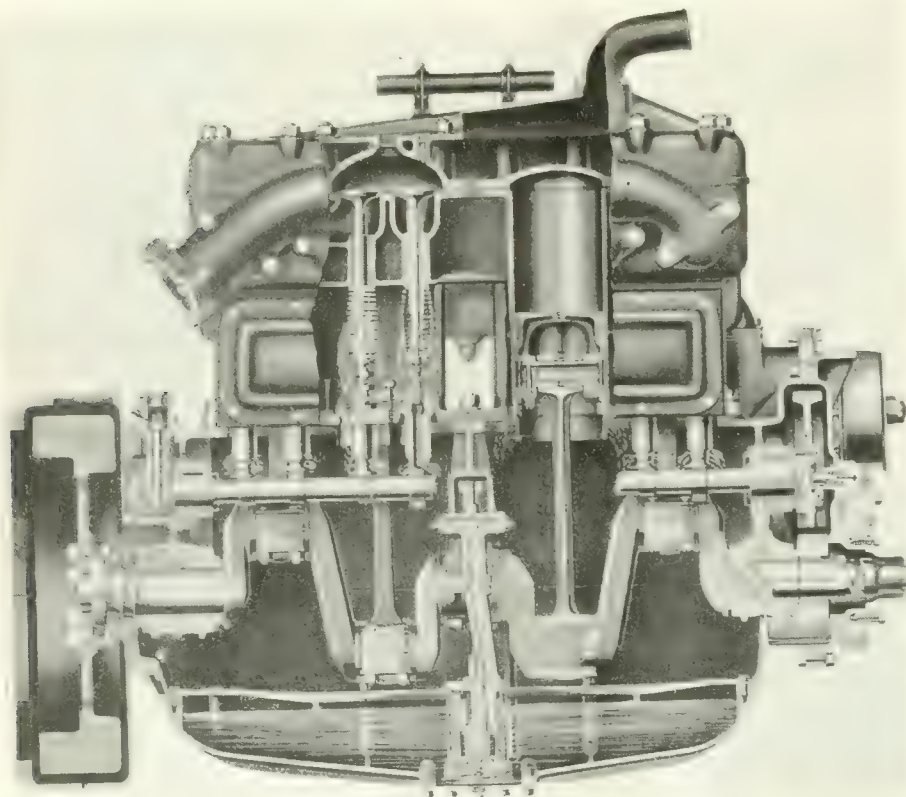
Motor trucks of a corporation furnishing transportation constitute permanent or fixed investments and are eligible for rediscount after they have been discounted by the seller, the Federal Reserve Board announced in a ruling issued last February. The ruling was brought about by a protest that motor truck paper should be eligible inasmuch as the Board had previously ruled that a farmer's note may be eligible when the farmer is to use the proceeds to purchase a farm tractor.

This letter raised the question as to eligibility for re-discount by Federal Reserve banks of notes, issued by a corporation engaged in the business of furnishing motor transportation, to provide funds with which to purchase trucks.

The formal opinion of the Boards read: "Farm tractors constitute only a small part of the entire equipment of a farm, whereas the motor trucks of a corporation engaged in the business of furnishing motor transportation necessarily constitute a very large part of the corporation's entire equipment. If the notes of such a corporation, the proceeds of which are used to purchase motor trucks, were declared eligible for rediscount by Federal Reserve banks, the result would be that paper representing in the aggregate a very large part of the corporation's capital investment would be eligible for rediscount, and it would not be reasonable to assume that such notes could be liquidated out of the corporation's current revenues.

"For this reason the Board believes that the motor trucks of a corporation furnishing motor transportation constitute permanent or fixed investments within the meaning of the Board's regulations. Consequently, under the terms of the Board's Regulation A, the notes of such a corporation issued for the purpose of providing funds to purchase motor trucks, are ineligible for rediscount by Federal Reserve banks.

"A note given by such a corporation to the seller in payment for motor trucks purchased is, of course, commercial paper in the hands of the seller, and is, therefore, eligible for rediscount after it has been discounted by the seller, provided it complies in other respects with the provisions of law and the Board's regulations."



Cross section of Buda engine, showing method of oiling



## Mileage Effect of Over-Tiring-Increases That Have Occurred

To the Editor, COMMERCIAL VEHICLE:

While no one can reasonably doubt that the fitting of larger tires than standard does increase the mileage to be gotten out of them, I have often wondered just what increase can be obtained. I know that this practice often is an inducement for overloading, but I believe that before the practice should be discouraged its effect upon tire economics should be examined minutely to discover, if possible, whether the use of larger tires under normal truck loads is or is not really economical.—CHARLES SCHEIDER, Newark, N. J.

The question is: Do over-sized tires increase mileage sufficiently to cause a lower cost per tire-mile, or is the net result the same?

As answer to this question nothing can be more convincing than actual records of users who have tried it. The table below was published a number of years ago in answer to a question similar to yours. From the nature of the experiences of the users, it would appear that the original equipment in many instances had been too small or else that the trucks, both before and after the change in sizes, were seriously overloaded.

For example, Firm A, which had only received 3800 miles from 36 by 4 duals, in fitting 36 by 5 duals only received the 8000 miles, which is normal, which proves little, because naturally tires so habitually abused as these must have been would wear out of all proportion to the life to be expected when properly applied. The same remark applies to a greater or less degree to all of the other firms, as far as rear tires are concerned, and to all but G and H on the fronts. It is from the latter firms that our lesson must be drawn. Here we see that these, with their normal 1000-mile excess over the guarantee, were satisfied and did not change tires.

On the other hand, conclusions are not so easily drawn in the cases of C, D, E and the second truck of H. Here tire equipments which previously yielded abnormally low mileages were made to produce unusually high ones, for which the most natural explanation is that the former tires were of the proper sizes, but were abused by improper methods of operation, the oversized tires, later applied, giving extraordinary mileages notwithstanding.

## Destructive Traction Wave—Its Meaning

To the Editor, COMMERCIAL VEHICLE:

Solid tires wear rapidly when under heavy load. The reason for this is simple, but is not generally understood. When you compress anything you make it occupy a smaller space than it did before. Thus, when you pump up a pneumatic tire you take a large amount of the surrounding air and squeeze it into the restricted space of the tube. That air is compressed because the same amount of it occupies less space than it did before.

## Table Showing Tire Mileage Increases Due to Oversized Tires

Firm	Wheel	Original Equipment		Oversize Equipment		Mileage Gain
		Size	Mileage	Size	Mileage	
A .....	Front	34 x 4	5,500	34 x 5	8,000	2,500
	Rear	36 x 4d	3,800	36 x 5d	8,000	4,200
B .....	Front	34 x 3 1/2	2,500	34 x 4	8,500	6,000
	Rear	34 x 3 1/2 d	2,500	34 x 4d	9,000	6,500
C .....	Front	36 x 4	5,000	36 x 5	8,000	3,000
	Rear	36 x 4d	5,000	36 x 5d	11,000	6,000
D .....	Front	36 x 4	5,000	36 x 5	11,500	6,500
	Rear	40 x 4d	4,600	40 x 5d	11,500	6,900
E .....	Front	34 x 4	5,500	34 x 5	8,000	2,500
	Rear	36 x 4d	4,500	36 x 5d	10,000	5,500
F .....	Front	34 x 4	5,500	34 x 5	8,000	2,500
	Rear	36 x 4d	4,500	36 x 5d	10,000	5,500
G .....	Front	34 x 4	6,000	34 x 5	8,000	2,000
	Rear	36 x 4d	5,000	36 x 5d	9,000	4,000
H .....	Front	36 x 5	8,000	36 x 5	8,000	0
	Rear	40 x 4d	4,000	42 x 5d	9,500	5,500
I .....	Front	36 x 5	8,000	36 x 5	8,000	0
	Rear	40 x 4d	4,000	42 x 5d	8,500	4,500
J .....	Front	34 x 4	5,500	34 x 5	11,000	5,500
	Rear	36 x 4d	5,000	36 x 5d	11,000	6,000
K .....	Front	34 x 4	5,000	34 x 5	8,000	3,000
	Rear	36 x 4d	4,000	36 x 5d	9,000	5,000
L .....	Front	42 x 6d	3,500	42 x 7d	8,000	4,500
	Rear	42 x 6d	3,500	42 x 7d	8,000	4,500

But rubber is not compressible. You can change its shape because of its elasticity, but not the amount of space that a given mass occupies. Therefore, we say that it is not compressible, but that it is replaceable. Take an ordinary pencil with a soft eraser on the end and squeeze it down on the desk. The eraser "squashes" out and bulges all round. It is shorter but it is also correspondingly wider. You have not compressed it by the pressure on the pencil, for you have not changed the total mass or volume—you have merely changed its shape by displacing part of it into the bulge. The softer and more elastic the eraser, the

ing and pulling of the rubber which accompanies it.

The traction wave is formed, in a solid tire, because the rubber has no space into which it can flow when it is displaced by pressure. If we cut notches in the tire, however, the rubber will bulge and the wave will travel only until a notch is reached into which the rubber can flow. The action of these displacement notches is twofold. When a truck is backed into the curb or other sharp obstruction, the surface of the tire is pressed in at one point and is stretched. Instead of extending this stretch throughout the large surface of the tire it is taken up by the notches which grow wider at the outside ends as the surface of the tire is elongated.

On the other hand, a tire with displacement notches subjected to load on a flat surface, especially at the moment of application of the engine power, will force the section of rubber in contact with the road out on each side because the resilient rubber has been flattened. But if this rubber has been flattened, it must also occupy a longer space because the mass or volume is the same. This added length of the section of rubber under load is absorbed by the displacement notches cut into the tire which, under such a condition, tend to close slightly as the tire revolves. As a succeeding section comes under load, the same action takes place, the elongation being absorbed by each of the displacement notches in turn. Thus the destructive traction wave is absolutely absorbed and the stretch and strain of rubber is localized.

The displacement notches in the tire also furnish a firm traction grip to driving or steering wheels when running through mud, sand or snow. The resilient rubber allows the portion of the tire under load to become flattened, but the displacement notch, as it turns into contact with the road, presents a sharp, firm edge to the road material. Each section of the tire becomes a soft, padded foot of large area.—J. W. MOWE, General Sales Manager, Kelly-Springfield Tire Co.

## Oversize Tires

IF you have used oversize tires on your trucks, what has been your experience? Have you effected economy in tire costs or suffered losses in repair bills through overloading?

## Do They Pay?

greater will be the amount of this bulge under a given pressure.

This displacement of the rubber is exactly what occurs in a solid tire. If the tire is sufficiently soft and elastic to produce resiliency, it will be considerably flattened at its point of contact with the road. The rubber which is pressed out by this flattening must go some place, and it squeezes out in the form of a bulge at the beginning of the point of contact with the road. Now as the wheel revolves, carrying its load, this bulge stays in the same place with relation to the road but continually changes its position on the rubber of the tire. Thus when the wheel is rolling this bulge forms what is known as a "traction wave" which is the principal cause of wear in a solid tire. The more resilient the rubber of which the tire is composed, the greater will be this traction wave with all of the increased stretch-





## A New Science

**I**N the old days the theory of salesmanship was too often based on the idea of selling anybody who would buy, and letting the buyer worry if the article did not suit or was not needed.

But that theory is exploded now in most cases.

It is exploded in the automotive industry among the more progressive. And if the truck manufacturers and assemblers who still sell trucks on that old basis, either directly or through their dealers, wish to stay in business, the sooner they come into line the better for their future.

For nowadays trucks should be, and in many cases are, sold to fleet owners only when the truck sold is exactly the vehicle needed by that fleet owner.

This is not a question of good will. Many manufacturers would like to satisfy their customers, even to the extent of losing a sale, where the truck is not needed or another type of vehicle would be more valuable. But many manufacturers do not know whether the truck is the one needed or not. And if they do not know, they cannot insure themselves satisfied customers and repeat orders.

But among the progressive the need to know the conditions under which the customer will operate the purchased vehicle is more and more appreciated.

And in the train of this need has grown up a new science. It is the science of transportation engineering as applied to trucks.

Several manufacturers already have an engineering department devoted solely to trucking problems of their clients. Others are adding this department as soon as possible.

At the annual convention of the National Electric Light Association in Chicago recently, Arthur Williams of the New York Edison Co. recommended the establishment of transportation engineering as a science. It will eventually be established as a science and an important one.

It will pay the manufacturer, too. For if the fleet owner knows that he is buying what he needs, instead of a possible pig in a poke, he will buy as many trucks as he needs, when he needs them; instead of buying one and trying it out, while his business waits.

The fleet owner's business will grow faster then, and he will buy more trucks.

Ask for this service from your truck dealer when you go to buy a truck, and see that you get it. Have your transportation problem analyzed by an expert and go over the figures with him. Motor transportation engineering is a good idea. Help it along.

## Dodging Traffic Jams

**T**O most delivery superintendents, routing the trucks means detailing the trucks to certain localities, each truck to cover a specified area.

But the progressive delivery superintendent can save a lot of time, wear and tear and gasoline on his trucks if he carries his routing a little further and makes it mean more.

For example, most routing is done by means of a map of the whole delivery area. The route of each truck is then indicated on the map. But it will pay the superintendent to mark on this map the areas subject to unusual congestion.

Thus, the main street of a town is usually fairly congested during business hours. Mark it in red and route the trucks operating in that vicinity on side streets, to avoid the congested area.

In the same way, the map may be marked with localities in which school children will fill the streets at certain hours, in which cinema crowds will fill the streets at certain hours, and so on.

Also, the superintendent should keep in touch with the road work of the town and note where and when roads are undergoing repairs, what bridges are temporarily out of commission, etc.

The superintendent should watch out for parades and other local celebrations and should route the trucks accordingly.

This is merely the outline of the idea, but the up-to-date delivery superintendent may well apply it to his business in his own way and thereby save much time and gasoline which would otherwise be wasted through traffic jams, detours, etc.



## Ohio Governor Signs Weight Bill

### New Law Hits 7-Ton Trucks—20,000 Lb. Weight Limit Effective Sept. 7

COLUMBUS, OHIO, June 17.—Despite the strong protests of the Ohio Automobile Trade Assn. and other State organizations, Governor Harry L. Davis of Ohio has signed the Burke Substitute Senate Bill No. 34 which was enacted by the last session of the Ohio General Assembly. The bill limited the weight of trucks and loads on all streets and highways of the State to 20,000 lbs. The former limit was 24,000 lbs. or 12 tons.

Under the new law which limits the weight to 10 tons, all 7-ton equipment will be put out of business and owners and operators of 5-ton trucks will have to be careful of loading.

The law provides for various tire widths as related to loads but sets the above as the absolute weight limit. In signing the bill which will become effective Sept. 7, Governor Davis said he believed that some amendments to the law were necessary but he believed in the principles involved and will permit the law to become effective.

City and county officials of Columbus have started a campaign to enforce the former State law of 24,000 lbs. and quite a few arrests have been made when trucks loaded to 26,000 and 28,000 lbs. were found. Heavy fines have been meted out to the offenders.

## Gasoline Railway Cars Keeps Operation Low

LOUISVILLE, June 18.—The Carrollton & Worthville Railroad Co., operating a strip of road 10 miles long, is the only company operating in Kentucky which has not raised passenger fares since the depression period began.

This company solved the problem by shelving its steam locomotives and substituting gasoline motor vehicles. The cars have attracted the attention of short line railroad companies as far south as Louisiana and as far west as New Mexico. Automobile manufacturers have studied them with a view to their practicability for adaptation to street car service.

Operation of one of these cars for one round trip costs \$2, counting repairs, labor, gas, oils and depreciation. The trip with a steam locomotive costs from 15 to \$18.

## Bethlehem to Make Wheel

BETHLEHEM, PA., June 22.—The Bethlehem Steel Corp. is entering the automotive field with the development of steel wheel for light and heavy motor trucks. This wheel is being made by a special process and has not developed to point where it can be placed on a commercial basis, but experiments with the heels are being made on trucks in vari-

ous parts of the country and the results thus far have been so successful that the corporation expects to have the wheel on the market in a short time.

## Compensation Ruling in Connecticut

HARTFORD, CONN., June 18.—Credited with establishment of a precedent, in interpretation of the Connecticut Compensation Law, a ruling made public here June 11 by Commissioner George B. Chandler, in a case to determine responsibility where there is more than one employer, is attracting much attention, especially among motor trucking interests, who consider it applies where men are employed by them in handling material under sub contracts.

The ruling is to the effect that a man in the employ of a contractor classes under the compensation law as an employee of the principal employer. It is based on the case of Daniel O'Connell of Broad Brook, Conn. O'Connell entered the employment of James M. Ravey of the same town, working at the clearance of woodland, which Ravey had contracted to do for Ahern Brothers of East Windsor Hill. The first day of his work O'Connell was injured and incapacitated for a week, after which he returned to work. Later he transferred his employment directly to Ahern Brothers and, while so working, his old injury was aggravated by a lifting strain and he was incapacitated for 9½ weeks. Compensation was paid by Ravey for the first injury and the Travelers' Insurance Co., insurer for Ahern Brothers, denied responsibility under the compensation act for the recurring trouble. Ravey's insurers also refused, on the ground that O'Connell was not employed by their policy holder.

O'Connell requested compensation, leaving to the commissioner to decide which employer should pay it. Commissioner Chandler interpreted the act to mean that Ahern Brothers were the principal employers and were thus responsible for the payment of the original as well as the second injury. The Travelers' Insurance Co., for Ahern Brothers, were required to pay a total of \$110.25 for compensation to O'Connell, for a total of 10½ weeks incapacity.

## New Truck Line Started

INDIANAPOLIS, IND., June 22.—W. C. Root, who has been connected with the Hodel Furniture Co., Shelbyville, Ind., for more than eight years, has resigned and has started a truck line between that city and Indianapolis. Mr. Root plans to operate trucks on regular schedule between Indianapolis, making one round trip a day and delivering all regular freight to the shipping points between Indianapolis and Shelbyville.

## Mack Service for Houston

HOUSTON, TEX., June 20.—The International Motor Truck Corp., is planning to establish a factory branch here. The branch will take care of service in Mexico and the Southwest generally, it is stated.

## Pneumatics Lessen Road Wear

### Bureau of Public Roads Finds Lighter Impact at Given Speeds and Loads

WASHINGTON, June 28.—The Bureau of Public Roads, United States Department of Agriculture, has recently made a series of tests at its experimental farm as to the exact amount of road damage that occurs from motor trucks. It has been found by the bureau that when a solid tired truck strikes a 1-in. obstruction in a roadway the impact may be as high as seven times the static load—it averages about four times as heavy; when pneumatic tires are used the impact under similar circumstances is seldom greater than 1¼ times the load.

The Bureau of Public Roads states that as a result of these figures, it feels safe in predicting that roads now being built will bear all the loads that are expected of them.

## Rear Bumpers Lower Rates

MILWAUKEE, June 20.—Automotive dealers in this city have been told of additional reductions in collision insurance that will become effective July 1. The Automotive Underwriters' Conference, which for some has given a 10 per cent reduction in the collision insurance rate for the use of front bumpers, so far as such accessories are approved by the Underwriters' Laboratories of Chicago, will offer an additional 2½ per cent reduction for the use of approved rear bumpers, when the list of such bumpers is ready.

## New Chassis Lubrication

SAN FRANCISCO, June 24.—A new chassis lubricating system by which grease is forced to the bearing surfaces of the chassis under high pressure has been developed by the Lathan Auto Supply Co. The Critz lubricator is made of heavy gauge brass.

The small diameter barrel used makes high pressure easily obtainable, and by means of the ball check head and the special fittings supplied, it is possible to reach all bearings without the use of flexible connections. The lubricator can be operated with one hand by simply turning the handle to build up pressure in the gun, after slipping the head over the nipple.

Where a bearing requires a quantity of grease the head is snapped over the nipple and the latch pulled, the head being locked to the nipple, and the amount of grease required is then forced into the bearing by turning the handle. It is claimed that the lubricator is capable of developing a 1500-lb. pressure. In installing the system, the old grease cups are removed from the chassis and replaced by the fittings of the Critz system.



## Goodyear Cuts Price on Truck Tires

### Reductions Range from 10 Per Cent on Cushion Tires to 23½ on Pneumatics

AKRON, June 20—The Goodyear Tire & Rubber Co. has made sweeping price cuts on all motor truck tires, including both solids and pneumatics and also cushion truck tires, effective to-day. The Goodyear price cuts will average 23½ per cent on all 6, 7 and 8 in. cord pneumatic truck tires, including the sizes most generally used on trucks and buses. Reductions on all Goodyear S. V. solid tires will average 12 per cent and on cushion tires the cut will average 10 per cent. Prices on pneumatic tires for trucks over 8 in. and on the new all weather solid tires for trucks will also be reduced to some extent.

Goodyear is the first major tire company in the United States to announce price reductions on truck tires. Practically all companies have reduced automobile tire prices, but none outside of Goodyear so far has revised prices on pneumatic and solid motor truck tires.

"These reductions will complete the stabilization of tire prices through the entire Goodyear line, following the reduction in prices on all kinds of automobile casings and tubes announced last month," says a Goodyear statement on the subject.

AKRON, OHIO, June 27.—The Miller Rubber Co. has announced the following reductions on heavy-duty pneumatic tires:

Size	Old Price	New Price
36 x 6 .....	\$119.35	\$ 91.85
38 x 7 .....	168.85	127.35
40 x 8 .....	217.50	164.00
42 x 9 .....	272.25	262.50
44 x 10 .....	380.75	367.00

### Truck Price Reductions

LOS ANGELES, June 22—Moreland Motor Truck Co. has reduced prices on all models effective to-day. The 1½-ton model is priced at \$2,800, 2½-ton \$3,500, 3½-ton \$4,600, and 5-ton \$5,000. The former prices on these models were \$3,125, \$3,900, \$4,975 and \$5,350, respectively.

DETROIT, June 15—A substantial reduction in the prices of all models of Wilson motor trucks is announced by the J. C. Wilson Co. Four sizes of trucks are made by this company and the reductions in prices range from \$380 on the 1½-ton model to \$755 on the 5-ton truck. The new and old prices follow:

	Old	New
1½-ton .....	\$2,650	\$2,270
2½-ton .....	3,300	2,825
3½-ton .....	4,300	3,685
5-ton .....	5,275	4,520

CHICAGO, June 15.—The International Harvester Co. has cut prices on its trucks as follows:

1-ton .....	\$2,160	\$1,874
1½-ton .....	2,425	2,032
2-ton .....	2,960	2,395
3-ton .....	3,450	2,750
5-ton .....	4,500	3,600

A 25 per cent reduction on cab bodies, tops, and other accessories is also announced.

CLEVELAND, June 16—Price reductions on all White truck models put the 5-ton model back to the 1914 price and the other models close to the pre-war figures.

Following are the revised chassis prices f.o.b. Cleveland:

¾-ton .....	\$2,600	\$2,400
5-ton .....	5,000	4,500
2-ton .....	3,450	3,250
3½-ton .....	4,500	4,200

### Commerce Guarantees Prices

DETROIT, June 18.—The Commerce Motor Truck Co. has notified its dealers that present prices on 1921 models of Commerce trucks are guaranteed for the remainder of the year.

### More Gasoline Price Reductions

NEW YORK CITY, June 24—The Standard Oil Co. of New Jersey has reduced the price of gasoline 1½ cents in North and South Carolina and 1 cent in New Jersey, Maryland, West Virginia, Virginia and District of Columbia.

Wholesale prices now in effect in the territory of the Standard Oil Co. of New Jersey are: New Jersey 22, Baltimore 21½, Washington 22, Norfolk 22, Charleston, W. Va., 23, Charlotte, N. C., 22½, and Columbia 21½ cents a gallon.

The Standard Oil Co. of New York has reduced ½ cent a gallon, making the wholesale price 24 cents.

### Black & Decker Hold Prices

BALTIMORE, June 20.—The Black & Decker Mfg. Co. has notified its distributors that present prices are guaranteed until the end of the year. The company states that the total increase in the prices of all its products since 1914 has been only 38 per cent, while the average advance in machine tool prices in that period was about 150 per cent.

### Martin-Parry Reduces Prices on Ford Bodies

NEW YORK CITY, June 20.—The Martin-Parry Corp., manufacturers of light commercial bodies with plants at York, Pa., and Indianapolis, has made another reduction in the prices of commercial and farm bodies for Fords. This reduction amounts to 10 per cent on certain models and became effective to-day.

### Coming Events

1921
June 30-July 1, 2, Milwaukee, Convention National Association of Commercial Haulers.
Sept. 28-30, New York City, Electrical Show, 71st Regiment Armory.
Sept. 2 weeks, Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.

## Trackless Trolley for Detroit

### General Electric Co. Brings Out New Type of Trolley with Rubber Tires

DETROIT, June 24—Detroit will give the "trackless trolleys" a tryout, the street railway commission decided to-day when it ordered advertising bids on 50 of this new type of combination street car and bus. If the new cars prove successful they will be used as feeders for the municipally owned lines now under construction. Some of the lines which the commission had decided to build with regulation tracks probably will be abandoned.

The new type of car is operated by electricity provided through the usual trolley but runs on rubber tires and does not require any tracks. The pole will swerve to permit the car to pass any other vehicle in the street, according to reports received by the commission.

If the bids are satisfactory the cars will be delivered in Detroit some time this summer. They are built by the General Electric Co. and were given a tryout in Schenectady June 15. According to the commission's reports, the tryout was successful. The cars have a seating capacity of thirty persons with standing room for fifteen more.

Engineers have reported that they believe the trackless trolley will revolutionize the present transportation system, according to the street railway commission. The engineers maintain that these new vehicles can be operated at a cost of 18 cents a mile, as compared with 40 cents for motor buses and 50 cents for street cars.

### Washington Buses Must Secure Certificates

SEATTLE, WASH., June 27.—An interesting case involving motor vehicle passenger transportation has developed in this State as a result of the new law providing that all motor bus lines must first obtain a "certificate of necessity and convenience" from the State Department of Public Works before being allowed to operate.

Joshua Green, president of the Puget Sound Navigation Co., which operates steamship services from Seattle and other Sound ports, has filed a protest with the State board against the issuance of the certificates applied for by motor transportation companies which desire to continue operation between Bellingham and Seattle and between Seattle and Tacoma. He contends that bus transportation between these points is unfair competition with the boat line. It is understood that the railroads will join in the protest. The motor bus companies are prepared to vigorously resist the protest, and they are already receiving assurances of public support in the fight.



# The COMMERCIAL VEHICLE

Read by Fleet Owners

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. O. Building  
239 West 39th Street, New York

## CONTENTS

Vol. XXIV, No. 12

July 15, 1921

### LEADING ARTICLES

Can We Wake Up In Time?..... 365  
Organized at Last!..... 366

### MISCELLANEOUS ARTICLES

Here and There With Trucks..... 374  
For Trucks Are Everywhere..... 375  
—At One-Third the Cost of Teams!..... 376

### DEPARTMENTS

The Better Way..... 378-381  
Buyer's Department:  
New 2½-Ton Nash Truck for Road Construction 382  
New Republic a ¾-Ton Model..... 383  
Truck Accessories..... 384-385  
Shop Equipment for Fleet Owners..... 386-387  
Motor Truck Electric System Wiring Diagrams 388  
Mechanical Hoist Saves Space..... 389  
The Fleet Owners' Forum..... 390-393  
Editorial: Why Not Standardize This Practice?.. 394

### NEWS

Will Continue Battle Against State Laws..... 395  
Start Reductions on Truck Prices..... 395  
Little Interest in Truck Action..... 396  
Trolley Company May Run Own Buses..... 396

Index to Advertisers..... 70-71

## The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT

David Beecroft, Directing Editor  
Ray W. Sherman, Executive Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

Chicago, Malters Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

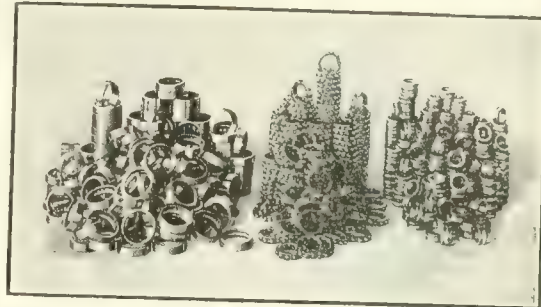
United States .....\$2.00 per year  
Extra Postage west of the Mississippi River on account  
of Zone Postage Law .....50c  
Canada .....\$3.00 per year  
Foreign Countries .....\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



## INTERCHANGEABILITY



Here is a pile of "NORMA" outer races—  
a pile of "NORMA" cages with balls—  
and a pile of "NORMA" inner races

You may select any  
outer race from this  
pile.

And any cage with  
balls from this pile.

And any inner race  
from this pile.

Put them together—and you have a perfect "NORMA" Precision Ball Bearing—accurate as to size and dimensions and alignment—perfect as to true and silent running—as "frictionless" as a ball bearing can be made.

This is "NORMA" interchangeability—and we believe there is nothing to equal it in the world of ball bearings.

Do you know of any other ball bearing that can be assembled from stock this way—and still be a perfect bearing?

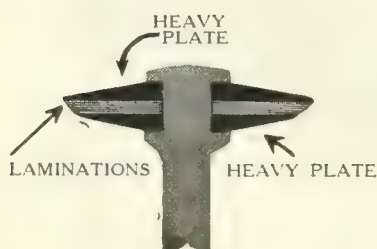
Think what this means in facilitating that progressive assembling which reduces costs and increases production.

## THE NORMA COMPANY OF AMERICA

Anable Avenue, Long Island City, New York  
Ball, Roller, Thrust and Combination Bearings

# Flexedge Valves

*Never Need Grinding  
and Always Hold Compression*



THIN LAMINATIONS HELD BETWEEN  
HEAVY PLATES GIVE A COMBINATION  
OF FLEXIBILITY AND RIGIDITY—THE  
TWO PRIME ESSENTIALS OF PERFECT  
VALVE ACTION

## NOTE

This is the second of a series of articles explaining the construction and operation of Flexedge Valves. The next article will be in Commercial Vehicle July 15. Look for it.

Note in the cross section view of the Flexedge Valve that the heavy plates at top and bottom are tapered toward the edge of the valve head. This gives the head the proper degree of rigidity to insure long life and at the same time allows the edges of the laminations to flex .001" on the closing stroke.

## This Flexing Action Eliminates Carbon

If carbon has been deposited on the valve seat this slight movement loosens it. The seat is always kept bright and clean. Of course, this flexing prevents any carbon staying on the edges of the laminations themselves. The result is a positive, compression-tight seal. Loss of power through faulty compression is stopped immediately.

A Flexedge Valve **never** needs grinding and because it always prevents the formation of carbon on the seat it **never** leaks. That means a saving in money and an increase in power.

## Write for Literature and Complete Information

Flexedge Valves are made for all truck engines—regular and oversize. A request for more information does not obligate you.

**SELF SEATING VALVE CO.**

340 W. HURON ST.

CHICAGO



# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXIV July 15, 1921 No. 12

## **Can We**

*Get Together and Pull Together, so as to Stop Legislation Unfair to the Motor Truck? It Threatens to Overburden Our Business, Halt Progress and Increase the Cost of Living.*

## **Wake Up**

*Fleet Owners! The More Progressive Among You Are Alive to the Danger. What They Said at the Milwaukee Convention Shows It. Are You in Line with Them?*

## **In Time**

*to Come, You Will Be Judged—You Will Stand or Fall—by Your Efforts at This Time. When the Industry Needs You. Read What Was Said at the Convention and Prepare to Play a Big Part.*

**The Whole Industry Is Threatened with Disaster! Only Cooperation—Unselfish Cooperation—Universal Cooperation—Will Win Out Now.**

# ORGANIZED 'AT LAST!

## *Commercial Haulers Unite to Fight for Rights and to Combat Menaces*

**Legislation, Business Methods, Hauling Methods and Many Other Features of Hauling Discussed in Able Speeches at Milwaukee Convention This Month**

*By SINCLAIR GLUCK*

**T**HE National Association of Commercial Haulers held its annual convention at Milwaukee on June 30 and July 1 and 2. From every point of view the convention was a success. And its past successes and future plans promise a fair field and no favor at last for an overburdened industry—the motor trucking world.

The Association has about 30 local organizations in as many different cities and a membership well on the road to the 50,000 mark.

The officers of the organization are: S. A. Sted, Cleveland, Ohio, president; John H. Schlitz, Milwaukee, Wis., vice-president; John H. Coughlin, New York City, vice-president; R. A. Chapin, Portland, Ore., vice-president; Fred A. Dunham, Toledo, Ohio, treasurer; C. R. Collins of Los Angeles, general manager, and Tom Snyder of Indianapolis, Ind., secretary.

### **Business Accomplished**

**M**OST of the actual Association business accomplished at the convention was put through at the closed meeting on the morning of July 2. At this meeting a resolution was adopted to instruct the executive committee to consult both the National Team and Truck Owners' Association and the National Warehousemen's Association, with a view to the amalgamation of all three associations, to form one big National Association to work for the interests of the trucking world.

The convention also went on record as supporting the Parts Manufacturers' plan of establishing 180 parts service stations throughout the

United States and condemning interests hostile to this plan.

It was also decided to separate the offices of General Manager and Secretary, held up to this time by C. R. Collins. Accordingly, Tom Snyder of Indianapolis was appointed Secretary. C. R. Collins continues as General Manager of the Association and will continue to carry on the nationwide work which has done much to place the Association in the powerful place which it holds to-day.

\*\*\*\*\*

**Union Is Strength  
Organization Means  
Union!**

**The Commercial Haulers  
Are Organized!**

**Are You?**

\*\*\*\*\*

There were many delegates present from all parts of the country. There were many representatives of the manufacturing world of trucks and truck equipment. And the officers and delegates and visitors worked together and planned together on the future of the industry from the fleet owners' angle, with a maximum of result and a minimum of friction.

### **Many Problems Discussed**

**T**HE delegates and visitors presented many well thought out views on a variety of subjects of interest to fleet owners and the trucking world generally. And the whole tone of the convention was constructive rather than critical.

For the past year, C. R. Collins of California has worked to build up an organization, the strength and dignity of which would make it worthy to represent

the gigantic and ever-growing industry of which we are a part. The men who gave their time to attend the convention and gave their thought to make the convention a success prove that he has succeeded.

The Association includes among its members many of the most progressive fleet owners in the country. It includes representatives of many of the biggest fleets in operation to-day. Its members convened from Texas and from New York, from Washington and Oregon and California and from the far South. And these men, representing as they do the dignity and progressive thought in motor truck transportation as it is to-day, met together and worked in harmony to place motor truck transportation in the place of dignity and influence which it should hold in the United States.

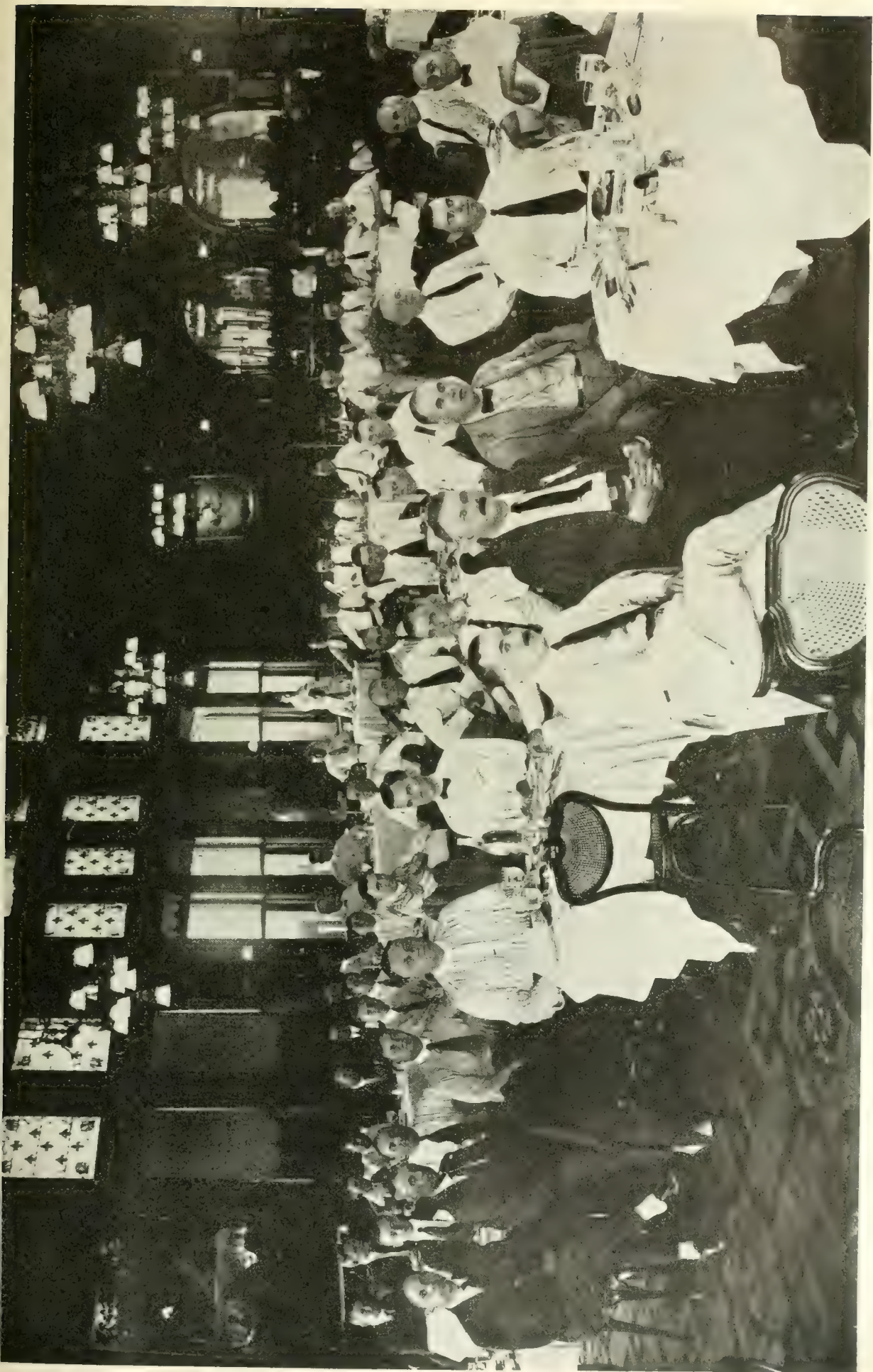
### **Association Sorely Needed**

Such an organization was sorely needed in the industry. Legislation unfair to trucks and to trucking business is on the books or in process of legislation in almost every State in the Union. The public does not realize what trucks mean. It does not realize that trucks are cutting down the cost of living; are making new industries possible and actual; are opening up new territories which the railroads are unable to serve; and are increasing the actual and potential wealth of the entire country.

The public has been too prone to listen to interests hostile to trucking interests, to individuals and organizations which are responsible for covering the country with ribbons of cement, at a cost of \$35,000 a mile, which will not last 5 years. So the legislators have also listened to those interests, and finding no opposition from the general public, have gone ahead to overburden trucks with taxation and in some cases practically to eliminate trucks of and above a certain standard and very necessary capacity from the roads altogether.

Then, too, there have been men in the industry whose business methods are questionable and who harm the standing





The banquet of the National Association of Commercial Haulers was held at the Hotel Pfister, Milwaukee, Wis., on July 1, the second day of the national convention held in that city. The speakers' table is at the left, in the background. Reading from left to right, the delegates and visitors at the speakers' table are: M. L. Hemmings, General Manager of the Motor and Accessory Manufacturers' Association; Homer Hilton, Sales Manager of the Winther Motor Truck Co.; John H. Schlutz, Vice-President of the National Association of Commercial Haulers; Harry Bryant, Donner Garage & Sales Co., Milwaukee; Oscar W. Kretzer, Toasbmaster, United Fireproof Warehouse Co., Milwaukee; C. R. Collins, General Manager of the National Association of Commercial Haulers; John H. Coughlin, Vice-President of the National Association of Commercial Haulers and President of the Van Owners' Association of Commercial City; Tom Snyder, Secretary National Association of Commercial Haulers; William Reese, Sterling Motor Truck Co., and I. T. Byrum, Troy Wagon Works Co.



of the whole industry in the eyes of the public by these methods.

Nor has there been any opposition worth mentioning to either of the above from the trucking interests generally. For the industry was not and is not organized as it should be. It is like the lion caught and tied with ropes and helpless to free itself, although one of the most powerful animals in the jungle.

### Freeing the Industry

But the National Association of Commercial Haulers, progressive and aggressive



*C. R. Collins of Los Angeles, Cal., general manager of the National Association of Commercial Haulers, who has done much to make the association a success*

sive in its methods and nation-wide in its scope, has been a big step in the right direction to change all this. And the type of organization which it represents will probably yet prove to be the mouse which gnaws away the ropes and allows the lion to regain its rightful place as one of the lords of the jungle.

Naturally, legislation was one of the big subjects most discussed at the convention. Selling methods were touched upon and the practice of recommending overloading was heartily condemned. The use of trailers wherever possible was recommended. And cost-keeping, overloading, business methods in hauling, and many other subjects were discussed.

But principally the plea was made

over and over again, and is made again here in these pages, that members of the Association and of the industry generally work together in a constructive, progressive spirit, rather than a spirit of antagonism and criticism; that fleet owners eligible to the Association join it and work with it and that all members of the industry work together in harmony to place the industry in the position of dignity, strength and importance which it undoubtedly deserves.

### Joseph Galvin's Speech

Early in the first meeting Joseph X. Galvin of Chicago, president and manager of the Pennoyer Merchants' Transportation Co. and president of the National Team and Motor Truck Owners' Association, addressed the convention.

Mr. Galvin said that he had come to the convention of the National Association of Commercial Haulers to urge most earnestly that the two associations be combined into one great nation-wide association. He said that his association could accomplish nothing alone and frankly that he was in business for his own interests, as he supposed were also the other fleet owners present. He thought that such a nation-wide organization was absolutely essential if the trucking industry and truck transportation was to grow and flourish and take its proper place in the national industrial field.

Mr. Galvin said that it did not matter who ran the organization nor what the name of the organization was. The main point was that the time had come to get together and form a really powerful organization to meet conditions as they arise—conditions which require immediate action in many cases. Now, he said, action is often not taken at all, or not taken until it is too late.

### Let Us Amalgamate!

The president of the Teamsters' Association pointed out that he had no selfish motive in suggesting the amalgamation. But he felt that the time had come for a real organization and one in which the members did not draw into cliques and knock the other members and the officers. That sort of thing has got to stop, he said.

"We must support our national association officers whom we elect, just as we willingly support the Federal officers whom we elect. We do not know their business as well as they do, so why criticize them and hamper them in carrying on that business, which is carried on in the interests of all?"

Mr. Galvin also touched upon business methods among truck haulers. He said that the spirit of the Association should be such that, if any member put across a business deal in transportation by truck which his fellow members considered unworthy of the industry, he should be told so and that his fellow members would not stand for such business practices.

Mr. Galvin, in favoring the convention idea, stated that it is harder to learn the real hauling game, with all its ramifications, problems and difficulties, than to

learn the law. What is more, the law can be learned from books, while the hauling business can only be learned by experience—either one's own experience or that of another hauler. Therefore, the only way to learn all there is to know about the business is by talking to others—to everyone who is in the same line. This is another advantage of such an association.

Mr. Galvin pointed out also that the problems of one hauler were practically identical with the majority of the problems of all operators in the hauling



*John H. Coughlin of New York City, vice-president, who took the chair at the convention meetings in the absence of the president, S. A. Sted of Cleveland*

game. Hence it is advisable and will be of immense value to all the men in this line of business to decide upon a policy which is fair and square to all and all stick to it.

In concluding, Mr. Galvin pointed out that in the past the industry had been burdened with a number of men whose business methods were not above reproach. He urged that any hauler who made a contract should stick to it to the end and if necessary go out of business—but go out clean.

### Mayor Hoan's Welcome

Shortly after Mr. Galvin's speech, Mayor Hoan of Milwaukee welcomed the delegates on behalf of the city.



The Mayor spoke of the importance of transportation during the war and after, stating that in the early days of the war the city was handicapped for lack of transportation. There are only two railroads running into Milwaukee and these were unable to handle the freight traffic. This state of affairs aroused an immediate and vital interest in other methods of transportation. They first turned to water transportation, and as a result the Mayor stated that Milwaukee now had the biggest and best harbor on the Great Lakes.

But water transportation was not enough and the city and State turned to commercial truck hauling. First of all they made it possible to build fine roads all through the State and this was done very rapidly. As a result, Wisconsin is far ahead of many other States in the number and excellence of her highways. And upon these highways and the truck traffic which they make possible, Mr. Hoan believes a large percentage of the prosperity of the State and the city of Milwaukee depends. He stated that he was proud of the industrious, prosperous and law-abiding citizens of Milwaukee and of the very small number of unemployed.

The Mayor closed his address with a general welcome to the delegates, stating that he realized the importance of their business to the prosperity of his city, his State and the entire United States.

### Tom Snyder Wins Ovation

One of the big, progressive and valuable speeches of this first afternoon of the convention was the address made by Tom Snyder, then chairman of the Uniform Methods Committee of the National Association of Commercial Haulers. Mr. Snyder is well known for his progressive activities in his home town of Indianapolis, where he is secretary of the Indianapolis Transfer and Warehousemen's Association and secretary to the Indiana Transfer and Warehousemen's Association.

Mr. Snyder opened his speech with a strong plea to the delegates and to all haulers to get away from their personal problems every now and then and to take a bird's eye view of the whole industry. He pointed out that no business man and no business is worthy of a big place in the nation unless it or he is capable of taking a big, broad viewpoint on civic and national affairs and trying to work toward a better city and a better nation.

The commercial hauler must analyze the relation of his business to industry generally. Moreover, he must realize that truck transportation includes both city haulage and inter-city hauling and so is national in scope as well as civic.

Therefore, the problem of each hauler, because to a great extent it is the problem of all haulers, is national in its application and importance.

### To Realize Our Strength

Above all, Mr. Snyder urged that each and every hauler should realize the importance of motor truck haulage busi-

ness to industry in general. If trucks stop running to-day the wheels of industry would stop also. This is not realized even by all the haulers themselves, and it is very far from being realized by

### Some Delegates to Convention

TOM SNYDER, Indianapolis, Ind. "Indianapolis Transfer & Warehousemen's Assn."  
 C. R. COLLINS, Gen. Mgr. N. A. of C. H. San Francisco, Cal.  
 TOM BARRY, New York City, "Merchant Truckmen's Bureau."  
 J. H. COUGHLIN, 210 W. 125th Street, New York City, N. Y. "Van Owners Assn. of Greater New York."  
 BEN. HORWITZ, Houston, Texas, "Westheimers."  
 C. WILLIAMS, San Antonio, Texas, "Seabays."  
 THOMAS SKELLET, Minneapolis, Minn. "Minneapolis Transfer Assn."  
 R. E. MARTIN, St. Clair, 106 West, Cleveland, Ohio.  
 J. JEKA, 673 Grove St., Milwaukee, Wis., Member T. A. O. W.  
 DAN C. McLEAN, Tacoma, Wash. McLean Moving & Storage Co.  
 MILO W. BEKINS, 1335 Figueroa St., Los Angeles, Cal.  
 DANIEL BEKINS, 12th and Madison, Seattle, Wash.  
 J. R. VELLAM, Hotel Statler, Cleveland, Ohio, Cleveland Transportation Assn.  
 W. C. WHELOCK, Cleveland, Ohio, Cleveland Transportation Assn.  
 WM. E. HUNGER, Cleveland, Ohio, Cleveland Transportation Assn.  
 J. J. McCABE, Cleveland, Ohio, Cleveland Transportation Assn.  
 RALPH KOLARIK, Cleveland, Ohio, Cleveland Transportation Assn.  
 H. A. BRYANT, Milwaukee, Wis., Downer Garage & Sales Co.  
 E. R. MILLER, Milwaukee, Wis., Member T. A. O. W.  
 H. G. STEINBERG, Milwaukee, Wis., Member T. A. O. W.  
 J. H. SCHLINTZ, Milwaukee, Wis., Central Div. V.-Pres. N. A. of C. H.  
 G. R. STEARNS, Milwaukee, Wis., Bell Express Co.  
 H. L. BERNHARDT, Milwaukee, Wis., Member T. A. O. W.  
 G. R. McLEAN, Milwaukee, Wis., Pres. T. A. O. W.  
 WM. E. STREIT, Milwaukee, Wis.  
 E. H. HANSEN, Milwaukee, Wis., Member T. A. O. W.  
 WM. WOLF, Milwaukee, Wis., Member T. A. O. W.  
 B. J. BAKTLETT, Huntington, Ind., Ind. Transfer & Warehousemen's Assn.  
 R. BIBOW, Milwaukee, Wis., Member T. A. O. W.  
 D. F. McKEOWN, Chicago, Ill., McKeeown Transportation Co.  
 P. MANSKE, Milwaukee, Wis., Member T. A. O. W.  
 FLOYD CORNELL, Milwaukee, Wis., Member T. A. O. W.  
 GEO. KASTNER, Milwaukee, Wis., Member T. A. O. W.  
 OTTO KEHREIN, Milwaukee, Wis., Member T. A. O. W.  
 OTTO B. THIEL, Milwaukee, Wis., Member T. A. O. W.  
 CLAY S. MORSE, Portland, Ore., Portland Draymen's Assn.  
 OSCAR KREUTZER, Milwaukee, Wis., United Fire Proof Warehouse Co.  
 WM. SCHAUS, Milwaukee, Wis., United Fire Proof Warehouse Co.  
 LOUIS PINZL, Milwaukee, Wis., Member T. A. O. W.

### Whole Country Represented

the public generally. "How can we expect the public, and the State and national legislation, to appreciate the importance of our industry and treat us accordingly if we are not broad enough

and progressive to realize it ourselves?"

There is also a tremendous importance in realizing the civic relations of the haulage business to a community. There was an interesting example of this in Indianapolis during the war. The freight stations throughout the city were congested almost beyond relief. This condition was interrupting the haulage and transportation of vital commodities. But the cartage men of Indianapolis, in co-operation with the Chamber of Commerce, tackled the problem and cleaned up the congestion.

### Haulage Men Save Road Wear

The transfer men of Indiana also report bad spots in the roads whenever they come across them. In this way the damage is caught and repaired before water can get in and deteriorate the road foundation. A department to handle road repairs of this sort was established at the instigation of the transfer men themselves.

Haulers should take this responsibility upon their shoulders and co-operate in this work in all cities.

Then there is a question of competition. Commercial hauling is a peculiar business in that many of the company's customers are also competitors. Hence the necessity for keeping down haulage rates to an absolute minimum. In Indianapolis an attempt was made to tax transfer men \$16 a ton for carrying coal, \$8 for lumber and \$6 for other goods. By amalgamation and co-operation the transfer men of Indianapolis fought this measure in the courts and got the amount reduced to a flat \$6 for all goods.

In the same way they stopped an ordinance requiring a 1-ton truck to pay \$11 and a heavier vehicle to pay \$21. They got this reduced to a flat rate of \$4.

In another instance the transfer men showed that level crossings were costing the city \$25,000 a day because of the constant holding up of traffic which they cause. The State was obstructing the work of elevating railroad beds. But the transfer men obtained an order from Washington to continue track elevation and saved the city many millions of dollars in this way.

In another instance the transfer men got together and established a standard charge of \$2.75 an hour for a 7-ton truck. The price cutters fell into line because everybody was getting this amount. The transfer men also formed a political organization in each county throughout Indiana. In this way they got a lien law passed allowing them to take a lien on goods hauled if not paid for within 10 days.

Mr. Snyder pointed out that it is vital to the industry and to national progress and prosperity to develop intercity hauling. But this must be done by the establishment of terminals distributed in such a way that each terminal center will be a pivotal point.

The National Association of Commercial Haulers has been in being for five years. Up to very recent times the attitude of the average hauler was: "What is a national organization to me?" But



oppressive legislation has recently altered this point of view.

Nine-tenths of the legislation relating to highway traffic at present is unfair to trucks, said Mr. Snyder. The passenger car interests are dictating legislation and having roads built of a nature detrimental to the interests of the truck haulers and of industry generally.

### Highway Work Obstructed

Our highways are mere ribbons of cement laid over all kinds of ground with no regard for their durability. Highways in Ohio, Indiana and Illinois cost \$35,000 per mile and they will not last five years. Frost breaks them up and they will have to be rebuilt. In several instances trucks have gone through these roads right up to their hubs, and trucks are essential to industry.

The passenger car men and the legislators of the various States are conscious of the fact that these roads will not last. But instead of working and legislating for better roads they are trying to curtail truck traffic so as to save the roads.

This is like building a garage that is too small for a car and then trying to cut the fenders and the top off the car so that it will fit the garage. But it is for this very purpose that the legislators are limiting the loads that can be carried by trucks. In Ohio there is a  $3\frac{1}{2}$ -ton limit. This is contrary to the best industrial interests of the country.

This is all wrong and it is up to the transfer men to stop this unfair legislation and to see that the roads are built right.

At present national road building is in the hands of the Department of Agriculture. This is all wrong. The building of the nation's roads should be in the hands of business men with a vision of the nation's industrial future and men who know the transportation needs of the various sections. Instead of that, the men who have been building our roads for the last ten years know nothing about transportation. These road builders are servants and do not say so even when they know that a road will not do.

If roads are to be built right they must be built by men who know transportation. At the present time 150 universities and colleges have schools of transportation. We must study both transportation and highway engineering if roads are to be built right. For at present material interests determine what the roads are to be and their determinations are not to the best interests of industry generally.

### Support the Townsend Bill

Mr. Snyder spoke favorably of the Townsend bill, pointing out that the bill tried to insure adequate truck transportation. He says that the farmers are in favor of the Townsend Bill and that the haulers must build up the bill and see that it is passed. This is not being done but must be done.

The truck haulers of the country are at present in the hands of the railroads and the passenger car men and at the mercy of an uneducated public and care-

less or ignorant legislators so far as motor trucking is concerned. He said that it would require a national organization and a big one backed with all the pep and power of its members to put across the education and propaganda necessary to insure a square deal for the motor truck and the motor truck operator.

There can be no doubt of the advantages of truck transportation in inter-city haulage. The railroads do not make any profit at all on the transportation of



*John H. Schlitz, vice-president of the National Association of Commercial Haulers and head of the local entertainment committee in Milwaukee*

freight for the first 35 or 40 miles, owing to the high cost of terminal handling. This is avoided in truck hauling.

### Trucks Cut Living Costs

Moreover, the use of trucks makes possible direct consignment from farmer to customer and this tends to cut down cost of living. In Indianapolis it has often happened that potatoes were selling for \$2.50 a bushel when farmers were willing and glad to sell the same potatoes for 75 cents a bushel on the farm.

Nowadays all citizens are direct consignees of the farmers through truck haulage. We truck operators are building up a new connection between the producer and the consumer.

In closing Mr. Snyder dwelt again upon the fact that transfer men generally do not realize the importance of their business to the country and their own personal right to consideration because of their business. They do not join clubs, they do not realize their rights and importance in the community.

Moreover there is too much strife in the industry. Haulers do not get together enough on a co-operative basis. The members of the National Association must hammer home the need for friendly and co-operative organization. There is too much suspicion rampant among haulers. Every man meets with antagonism when he tries to form an alliance among haulers. This must be done away with and the haulers of the country must get together and work together at this time of vital need, in order that the industry

may survive and progress unchecked by unfair legislation and that the country may prosper.

Mr. Snyder's speech met with an ovation from the convention.

### Coughlin on Labor Question

John H. Coughlin, vice-president of the National Association of Commercial Haulers and an officer of the Van Owners' Association of New York City, addressed the convention on the subject of the labor question in the haulage industry.

Speaking of his own organization in New York City, Mr. Coughlin said that the Van Owners' Association was 9 years old. During the war, and in fact for 8 years, the Van Owners' Association had gotten on well with their employees. At the present time the members of the association are paying the highest wages paid in any similar work in the United States.

The Van Owners' Association had one big strike. They fought it to a finish and won out and they now have an open shop. But in spite of this they are paying excellent wages, and they have now joined a benevolent association of employees through which they handle all dealings with the men. This benevolent association works well and is appreciated by both the employers and the employees.

Mr. Coughlin also stated that at one time the van owners had no regulation of prices. But the association got to work on it and they now have an almost uniform hourly rate for all haulage.

### Tom Skellet's Speech

The convention was also addressed by Thomas Skellet of Minneapolis, who is an officer of the Minneapolis Transfer Association. He is also chairman of the labor committee of the N. A. C. H. Mr. Skellet spoke of the losses suffered by haulers through the competition of cheap "snowbirds" and scavengers. He said that manufacturers were responsible for a good deal of this cheap competition because they had sold trucks on false premises. He said, however, that this type of salesmanship has decreased greatly and that the average hauler did too much worrying about cheap competition because it was on the down grade and could not last anyway.

In speaking of the work of his local organization he described how the organization was up against a big strike and was practically helpless because it could not get guards to protect its property and the city authorities appeared to be in sympathy with the strikers. Eventually the association got in touch with the big business men of Minneapolis and made them realize that the strike was harming all industry in the city as well as the population itself. These big bankers and so forth took the matter up with the city authorities, furnished guards and proved themselves back of the haulers in their fight. In two days the strike was over. Why? Because the city was made to realize that the really big local business was affected.

In passing, Mr. Skellet urged tha



every hauler should keep in touch with his local Chamber of Commerce and with the National Chamber of Commerce. He also said that the customers who use the trucks of the commercial haulers were really not looking for low prices so much as for service. "Do not be afraid of the customers to whom you are catering. The laborer is worthy of his hire, and if the business is respectable and respected, it must so regard itself."

### Some Haulers' Problems

Mr. Galvin addressed the convention again on a number of subjects of interest to haulers and fleet owners generally. He stated that he did not believe in the hundred thousand mile basis for figuring costs. He thought it was too high.

He went on to urge that fleet owners should not overload their trucks, as it was not only breaking down the roads but breaking down the trucks as well. "Be square with yourself," he said. "If you put 7½ tons on a 5½-ton truck you may think you are making more money that way. But you are not, for you are depreciating your truck much more rapidly."

He spoke of lost time and the importance of keeping track of it, and as an instance of this mentioned the fact, little appreciated among fleet owners, that tires depreciate more rapidly in many cases when the truck is laid up than when it is in service. Overloading also depreciates tires too rapidly.

"It is a great pity," he said, "that insurance men will not insure trucks against theft without making so many conditions that the insurance is practically worthless. Moreover, they will not handle insurance on goods hauled to cover accident. And unless you have a delivery clause in your contract it will not cover damage caused by loaders." He said it was important for the haulers to realize the responsibility they are often obliged to take in hauling valuable machinery. This is not covered by insurance. Haulers should remember that it is very easy, for example, to spring the bed of a lathe in loading or unloading it or in transit. But this may mean a loss of several thousand dollars.

In speaking of costs he said that it cost money to hire a man who can tell you by the middle of the month what you have made during the last month but it is worth while. The margin of profit in the commercial hauling business is small and no up-to-date business man can afford to wait until the end of the year to find out what its profits have been.

### Ass'n Work in California

Later, Milo W. Bekins of Los Angeles, Chairman of the Finance Committee of the N. A. C. H., addressed the convention. Speaking of the work which the local association had done in California, he said that at one time there had been a proposal to tax trucks \$2,000 annually over ton of capacity. Fortunately the local organization of California had been strong enough to defeat this.

In California intercity haulage is reckoned on a mileage and tonnage basis at the present time. So much is charged



*Tom Snyder of Indianapolis, secretary of the National Association of Commercial Haulers and a well-known figure in the trucking world*

for a minimum of 3000 lb., also based on the distance, and so much for over that tonnage. Since the installation of this



*Oscar W. Kreutzer of the United Fireproof Warehouse Co. of Milwaukee and the able and entertaining toastmaster at the Friday night banquet*

system the haulers are making money; which is more than could be said for them before this.

Clay S. Morse of Portland, Ore., in

addressing the convention, said that they now have a uniform tariff in Washington and Oregon based on the California figures.

They also have been very successful since the installation of this basis of charging haulage. In closing he said that one of the most important features of a successful National Association was harmony between the different organizations which made up the national body. He hoped that all the delegates present would give their utmost efforts to this end.

D. C. McLean of Tacoma, Wash., who represents the McLean Moving & Storage Co., told the convention that his local organization includes 90 per cent of the local haulers and they do not have to worry about the remaining 10 per cent. He said that they had a valuable affiliated body in the Northwest Transfer & Warehousemen's Association, but that they had not been able to make a state organization successful. They had been having trouble in California with the Public Service Commission on hostile acts and legislation generally.

Mr. McLean also referred to the fact that the manufacturers had put over a number of local deals which were not based on the best business traditions and which had hurt the industry generally.

### What Seattle Association Did

Dan Bekins of Seattle addressed the convention on the local truck owners' association.

He said that this used to be the team owners' association and that they now have 260 local members in good standing. He questioned whether such an organization was not too large to function efficiently. They number all sorts of haulers among their members, and for this reason they are not always able to come to a decision as to what is the best thing for all concerned.

He said that like most of the Northwest, with the exception of Spokane, the town is unorganized. However, they are getting on well with the unions. They had a big strike recently but managed to win it after spending a lot of money, because the big business men backed them.

Later some of the business men tried to reduce the rates. The haulers were running the association, but these business men thought the drivers should run it, and so they were instrumental in forming the union. However, the speaker believed that eventually they would have the open shop.

He said that they had not been very lucky as regards taxation. They have a tax of \$125 on a 5-ton truck and \$60 on a 2-ton truck. Nor is this all, because, while the \$60 was supposed to be an annual charge it was good for only 10 months. However, after spending a lot of money they beat this last feature.

### Trouble in Indiana

J. P. Bartlett of South Bend, Ind., in addressing the convention said that he was a little discouraged with the work in Indiana. He said that they had few



*M. L. Hemingway, general manager of the Motor & Accessory Manufacturers Association. Mr. Hemingway was a visitor from New York City*

big fleet owners. Most of the haulers operated from three to twenty trucks and were somewhat difficult to organize. He said that they had a strong State passenger car organization in the Hoosier Automobile Club. He said that this organization was working against the interest of the trucks.

In answer to this speech, Mr. Coughlin of New York City stated that he had found the smaller fleet owners not only easy to organize but very important to the organization. He said that the New York organization had had a great deal to do in defeating anti-truck city ordinances and that other similar organizations can accomplish the same results.

W. C. Wheelock of the Cleveland Transportation Association, Cleveland, Ohio, also replied to Mr. Bartlett, stating that his organization is almost entirely made up of small operators. He said that it is the small fellow with from three to five trucks who is really interested in an active organization of commercial haulers. He said that the quicker we can realize the importance of small men who represent the community at large, the sooner the association as a whole will be representative and powerful.

He also said that he thought that two national associations were uneconomical and that the haulers should throw the whole thing into one big association and halve the cost of carrying on the work.

### The Question of Overloading

H. A. Venable of Chicago, a representative of the Garford Motor Truck Co., said that he had analyzed transportation and that this analysis included or should include not only the company's books but the actual running of the trucks. He

said that a salesman should always get the story of the customer's business and should analyze his costs. But he said that this was sometimes difficult because many fleet owners fail to keep a daily cost record.

"It is difficult to give any basis of depreciation, because on one type of work a truck will run only 40,000 miles, while in another type it can and will run 100,000 miles. So the costs are different and the first case may mean a loss of money to the operator."

In speaking of truck life, he said that a truck of 3½ tons and over averaged 35 miles per day, and in a 300 day year this meant about 10,000 miles per year. On a 100,000 mile basis this meant a life of ten years.

Mr. Venables stated that in selling trucks he urged that fleet owners should



*G. R. McLean, president of the Transportation Association of Milwaukee. Mr. McLean is a commercial contractor in Milwaukee*

not overload more than 50 per cent at any time.

Mr. Galvin was on his feet at once, stating that such a policy was bad business and caused an incalculable amount of harm to the industry.

Mr. Coughlin also stated that salesmen who advocated overloading were making a big mistake.

Mr. Ben Horwitz of Houston, Texas, said that in some of the taxation in his State the legislators had exempted a 1-ton truck because it was so extensively used by the farmers. This had worked a hardship to operators of heavier trucks because, while the 1-ton truck might not appear a formidable competitor, it was nevertheless the biggest competitor the haulers had because it was often loaded with 2 and 3 tons of merchandise. Thus the 1-ton truck, being untaxed, could haul cheaper than could the heavier vehicle by means of overloading.

He said that the railroads were back of a law in Texas to tax trucks from 2 to 8 cents per mile. If this tax were passed it would either put the trucks out of business or work a great hardship on the consumer in sending up the cost of transportation and so increasing the cost of living.

Mr. Horwitz recommended the use of both teams and trucks for different classes of work.

### Hard Times in Milwaukee

Oscar W. Kreutzer of Milwaukee, who is a member of the Transportation Association of Wisconsin and who was chairman of the National Association banquet on Friday night, next addressed the convention. Mr. Kreutzer spoke vehemently on the subject of truck selling methods. Ninety-five per cent of truck owners in Milwaukee are in financial difficulties, he said, because of manufacturers' and salesmen's selling methods. Trucks have been sold on a false basis. There are 50 per cent more trucks in Milwaukee to-day than the traffic will bear.

Mr. Kreutzer spoke of the need of highly paid office help in truck operation. He said that through efficient help he had earned a better price for furniture moving than 98 per cent of his competitors. He made \$41,000 gross in the last year.

This meant a 5 per cent loss in hauling. He charged his overhead on a value basis charging one-third to the trucks and two-thirds to the warehouse.

Mr. Kreutzer installed time clocks on which the drivers check in and out on each job.

By this means he could charge for each job on a time basis. Also, he knows exactly how long drivers are idle and



*Otto B. Thiel, original organizer of the Transportation Association of Wisconsin and director of the Dump Truck Committee of the N. A. C. H.*



how long they are on unproductive warehouse work.

### They Do Not Keep Costs

Mr. Kreutzer said that not 2 per cent of the cartage men in Milwaukee know exactly what it costs them to do business. He hoped that the National Association or a local chapter of it will adopt an adequate cost keeping system for the use of the commercial hauler.

Speaking of legislation, Mr. Kreutzer said that the Wisconsin Legislature had passed a bill which put the 3½-ton truck and over out of business in intercity haulage if the Governor signed the bill. He said that this bill never would have passed the Legislature if they had had an organization strong enough to make the legislators realize what the elimination of the heavy trucks would cost the community.

Mr. Galvin stated that he wished to go on record as in favor of the trailer in city haulage work where it can be operated—that is, left on the street to be unloaded—but most city ordinances forbid this. In such a case the only possibility is to unload the trailers on your own property.

J. W. Menhall of the Highway Trailer Co. said that while certain city districts were too congested to allow trailers to stop in the streets, there were usually alleys which could be used. But he said that in order to operate trailers it is necessary to know the trailer game. The drivers must be taught how to back a trailer and should be paid extra money because of the additional difficulty of their work.

They would then be enthusiastic and his enthusiasm would be of great value to the operator.

At the open session on Friday Mr. Galvin stated that the manufacturer's trucks

made contracts with the seller of those trucks, and consequently was responsible for the seller's action. He said that he would like to urge with the manufacturers that they get in touch with their sellers and make them sell right.

Mr. Galvin also said that the haulers themselves were a good deal responsible for the present anti-truck legislation. In the past they had tried to cheat, to overload, to overspeed, etc., and they had brought the laws on themselves.

F. J. Alvin, manager of the U. S. Motor Truck Co., said that the manufacturer who hires a dealer to sell trucks for him, without supervising that dealer's methods, commits a crime against the industry.

Tom Snyder spoke of the importance of class consciousness among commercial haulers. He said that if we had it and used it there would be less legislation



*Joseph X. Galvin, president of the National Team and Truck Owners Association, who attended the convention to urge amalgamation*



*Edwin R. Miller, truck master of Milwaukee and vice-president of the Transportation Association of Wisconsin. He is a member of the N. A. C. H.*

hostile to trucks and we would be better off.

"Some day," he said, "we are going to build highways over which we can haul large tonnages and obtain high speeds and then we can find the real economic relation of motor truck transportation to other forms of transportation."

### Placing the Overload

Ike T. Byrum of the Trailer Mfg. Association said that the idea of the trailer was not new. He said that the Indians had used it in hauling more goods on poles behind the horses than the horses were able to carry. For it does not pay to overload a horse or a truck or any other equipment. Moreover, if the manufacturer wanted you to carry 7 tons on his truck, or thought that you could do so, he would list that as a 7-ton truck.

It is the contention of the trailer man that it is much better to place the overload on a trailer under favorable conditions. He stated that in 209 lines of business trailers were being used behind 86 makes of trucks.

Speaking of salesmanship, he said that any good manufacturer would fire a salesman who made a man install the wrong type of equipment. It wasn't fair to say that the trailer would double the capacity of the truck. An additional 50 to 85 per cent would be fairer. It might save 40 per cent of the original investment and 70 per cent on operation, but this might not apply to all business.

Mr. Alvin pledged the U. S. Motor Truck Co. to support the N. A. C. H. He said that manufacturers and truck operators should take time to meet one another and discuss the problems of the industry. He said that trucks are as essential to present day progress as is the telephone or the telegraph. We could not have won the war without their use. Motor trucks rushed food into Pueblo when all other methods failed.

### Concentrate on Problems

"The trouble is," he said, "that we are going at the business of the industry in a hit or miss fashion. We should concentrate on the problems of the industry." He also said that in our national association as in our Federal Government we must not have representatives that misrepresent.

"The trouble with the truck manufacturers is that they lack ethical business methods. They have not tried to sell right. They have taken the stand that anything is justified in making a sale. There are only 100 cents in a dollar and the man who tries to give you a \$2 value

(Continued on page 392)



*Fred Born, managing secretary of the Transportation Association of Wisconsin and an active member of the N. A. C. H.*

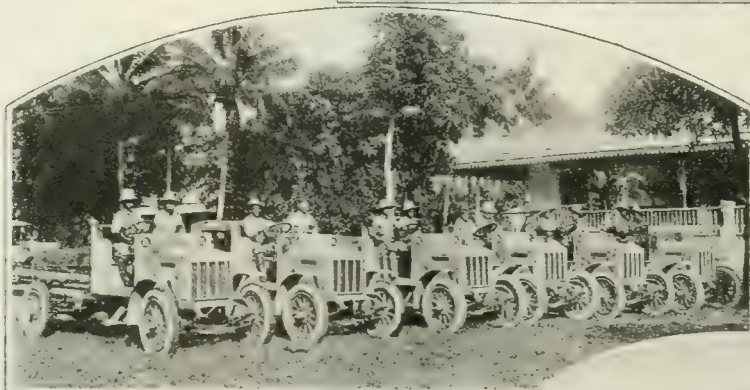
# Here and There With Trucks!



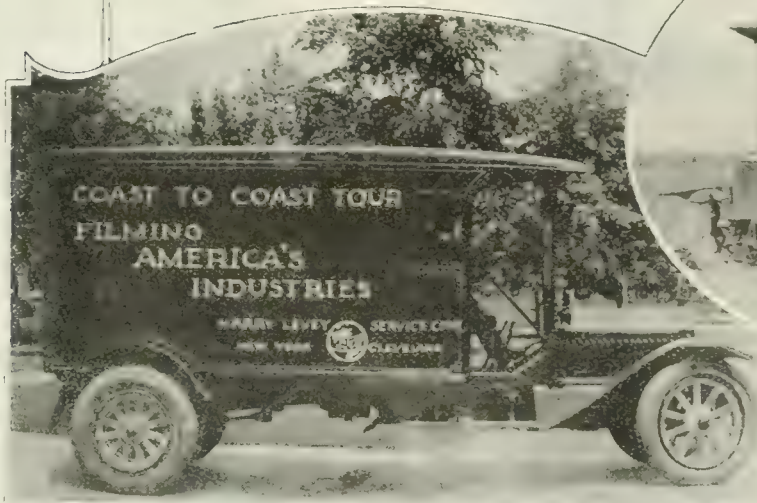
1



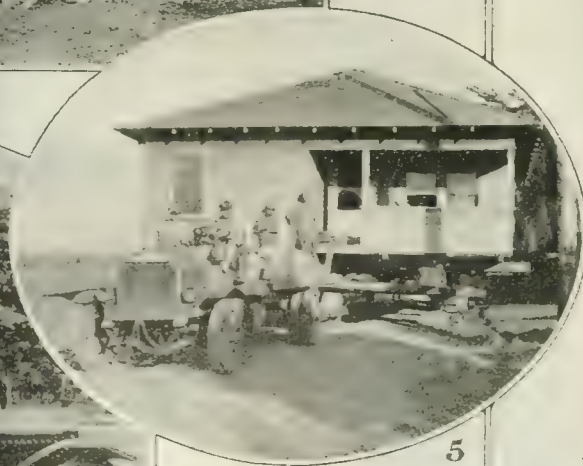
2



3



4

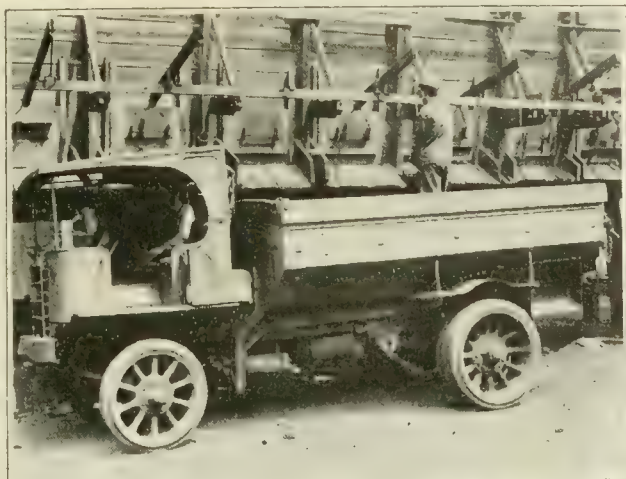


5

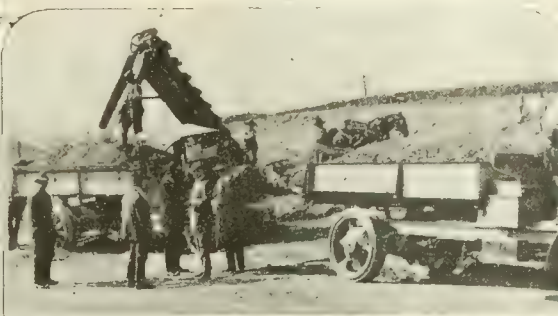
1—Who is responsible? These United States Army trucks were parked on the banks of the Rhine and left there. The river overflowed and marooned the trucks, as the picture shows. Now it is understood that these trucks have been acquired by a foreign syndicate, to be offered for sale in the United States. 2—Dorris 3½-ton truck, equipped with an A. B. C. refrigerator body. The body requires 600 lbs. of crushed ice and 120 lbs. of rock salt per day. 3—Fleet of Clydesdale trucks under the sheltering palms of the island of Java where they are owned and operated by the government. 4—This illustration is self-explanatory. The truck has visited all manufacturing centers. 5—The owner of this house had either to tear it down or move it 4 miles. Finally it was jacked up on wheels, the big Federal hitched on and the house was towed the entire distance in 6 hours without a mishap of any kind



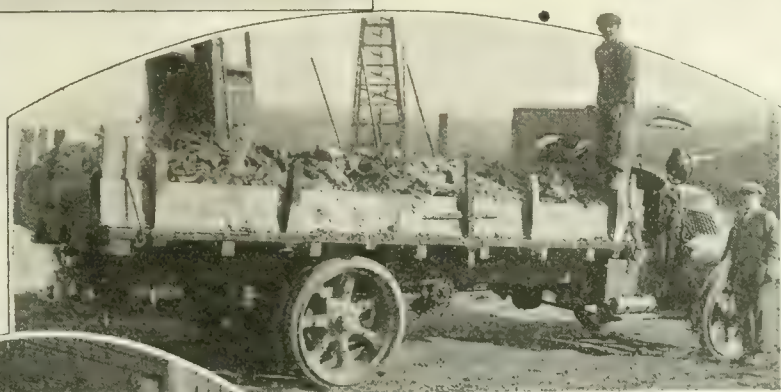
# For Trucks Are Everywhere!



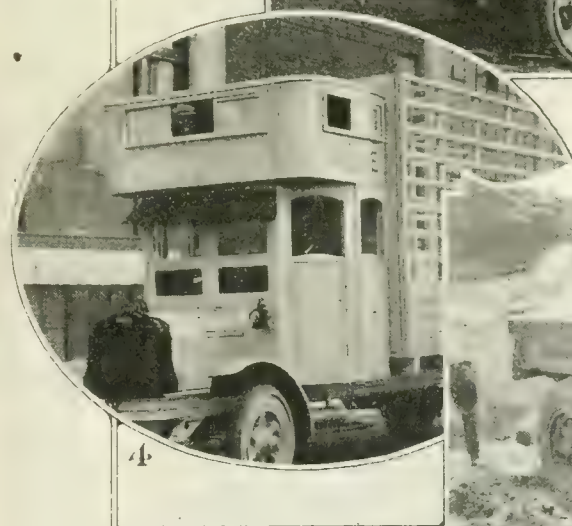
1



2



3



4



5

1—This 6-ton Garford hauled and delivered 200 tons of coal in 4 hours. Although the work was done under ideal loading, running and dumping conditions, it required perfect truck performance. Each round trip was two blocks. The truck hauled 9 tons a load and made a round trip every 11 minutes, at a ton-cost of \$0.068. 2—Road building in California. These White trucks make six round trips daily, averaging 13 miles in length and carry from 5½ to 6 yards of gravel. Four horses, hauling a wagon and 2 yards of gravel can make only 2 round trips, a ratio of 35 to 4 in favor of the trucks. 3—A big Mack truck hauling precious mud from one rotary well to another. The mud is used in drilling and is only loaned. 4—Where the spare driver sleeps! Look at the bedroom above the cab. 5—A lady owns this truck, which is seen loading in a sand pit. Note the pneumatics with which the truck is equipped!

# —At One-Third the Cost of Teams!

## Truck Hauls Coal and Ice All the Year Round for 7 Years and Costs for Repairs Total \$45

AT the end of 7 years of steady, year-round service, this truck is still doing 7 miles to the gallon and has cost just \$45 for repairs, altogether!

The truck belongs to Oley Landey of Ankeny, Iowa. It was purchased in 1913 and was the first truck to be operated in that territory.

At that time there was considerable speculation as to whether a truck would pay on the local dirt roads. But the Selden proved a good investment from the start.

Before he bought the truck Mr. Landey had been using two teams for delivering ice and coal in Ankeny, driving one team himself. But the truck easily took care of the entire work and at a lower cost, although the work was getting too extensive for two teams to handle.

Last year the work was twice as large in volume as it had been 7 years before, when the truck was purchased, but the truck is still able to handle it all.

If Mr. Landey were still using horses he would need from two to four teams, at least, and the additional cost for drivers alone would just about double his hauling costs.

### Truck Increased Business

Mr. Landey states that this increase in his business is due very largely to the truck. It has enabled him to give better service to his customers and still keep down his hauling costs. He has thus been able to give his customers the benefit of this saving and so built up a steady business.

The truck is busy all the year round. For six months of the time it is delivering ice. In the six colder months it is delivering coal. The customers demand a steady service and the truck has made it possible to give them this service.

In the summer time the truck makes two trips a day to Des Moines for ice. This is a round trip of 18 miles, making 36 miles per day. But this is the nearest ice plant. The average load is 3750 lb.

Mr. Landey keeps very careful and accurate cost figures. His cost for hauling ice works out at about \$2.62 per ton or 13.1 cents per cwt. Hauling ice over the same distance with horses would cost \$8.55 per ton or 42.75 cents per cwt.

If this haulage had to be done by team Mr. Landey would have to charge about three times as much as he now charges. At that rate, he would soon be out of the ice business, he says. People would simply refuse to pay any such

price and would get along without ice. As it is, they get their ice at a reasonable figure and he makes a fair profit.

The cost figures for the 6 months during which the truck hauled coal are shown on these pages, laid out on sample sheets of THE COMMERCIAL VEHICLE

Standard Cost Keeping System for Motors Trucks.

Mr. Landey obtains his coal direct from the mines, which are located about 4 miles from Ankeny. They are what are called "wagon mines"—that is, they are not on the railroad and the coal is

The Commercial Vehicle—Truck Cost System			
6 Month <sup>s</sup> ending _____ 19__			
Make of truck <u>Selden</u>		Gasoline Electric	
MONTHLY COST SUMMARY SHEET U. P. C. BOOK COMPANY, INC. 243 249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline	463 gals.	\$ .28	\$ 129.64
Current	— kw-h	—	—
Oil	184 qts.	\$ .15	27.60
Grease	— lbs.	—	—
Kerosene	— gals.	—	—
Waste	— lbs.	—	—
Dist. Water	— gals.	—	—
Driver	120 days	\$ 6.25	750.00
Helper	— days	—	—
Mechanic	— hrs.	—	—
<b>A—Total Operating Charges</b>			\$ 907.24
<b>Maintenance Charges</b>			
*Tires	3360 miles	\$ .0108	\$ 36.29
Repairs	Overhauling, painting, etc.	3360 @ \$.015	50.40
Spare vehicle rental			45.00
Garage rental (pro rata)	@ \$90 per year		
<b>B—Total maintenance charges</b>			\$ 131.69
<b>Fixed Charges</b>			
Insurance, fire	— per year		\$ —
Liability	— per year		\$ —
Collision	— per year		\$ —
Interest	8% (On Item 1—X2)		92.00
Depreciation on chassis	103.48 per mile for 3360 miles		116.93
Depreciation on body	—		—
Depreciation on equipment	—		—
*Depreciation on tires	—		11.25
Total taxes and licenses	—		—
<b>C—Total fixed charges</b>			\$ 220.18
			\$ 1259.11

\*Note. Omit one of these.

Operating, Maintenance and Fixed Charges on the 1½-ton Selden during the 6 months in which the truck was engaged in hauling coal. The interest item is incorrectly estimated as it has been worked out on a flat 8 per cent basis yearly. As the truck depreciates each year and this depreciation is written off, the interest item should decrease accordingly. Then all the interest figures should be added together and averaged for the yearly charge



hauled in wagons to nearby points. But even if these mines did ship by railroad direct, the coal would have to go through Des Moines, where, according to Mr. Landey, the freight congestion is very serious.

As the cost sheets show, hauling coal with the truck costs about \$1.20 per ton. This is the total cost for the period, divided by the number of tons actually hauled. But it is based on a 5000-lb. load and a 4-mile haul.

Here, again, hauling by team would cost about three times as much, provided the teams worked as regularly as the truck. But it is doubtful whether the teams could have made some of the trips made by the truck over poor roads in the winter.

### Coal Not Regular

The haulage of coal is not so regular as the ice delivery. The truck makes

### What the System Costs

On these two pages are shown filled-in sample sheets of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

from two to five trips a day during the six months of coal haulage, depending upon the demand. But in 6 months the truck will haul about 15 carloads of coal. And Mr. Landey draws attention to the fact that by taking care of Ankeny the truck releases just that many freight cars for hauling coal to towns which depend upon the railroad for their coal supply.

### Repairs Cost \$45 in 7 Years

During the year ending May 1, 1920, the Selden was out of service for 35 working days. These lay-ups were mainly because of heavy storms which made the dirt roads impassable to any kind of vehicle. The truck has never been overhauled in its 7-year life. The valves have been ground, the carbon removed from the cylinders and one piston ring replaced and that is all.

In estimating his operating costs Mr. Landey has paid himself \$125 a month as driver, because that is what he should have to pay anyone else. He always drives the truck himself. He has estimated his repair at 1.5 cents per mile, or about \$130 per year. The depreciation is based on an estimated life of 60,000 miles. But the truck has already approximated that figure, so that it is now entirely paid for in depreciation. And apparently it has many thousands of miles which it can still run.

Mr. Landey adds: "I understand that a truck working as my Selden has done is supposed to be good for only about 5 years. My truck has already put in 7 years of hard work, winter and summer, and looks good for 2 or 3 years more. It has been a profitable investment for me and has kept my neighbors supplied with coal and ice at reasonable prices all the year round."

### Costs Compared and Analyzed

The cost figures on these pages show the costs for the 6 months of coal haulage.

The operating charges, gasoline, oil and driver's wages, would seem accurate and about the average for a 1½-ton truck. Under maintenance charges, however, the charge of about 1 cent a mile for tire depreciation would seem too low, especially for a truck operating over such poor roads.

Judging by actual costs, the charge for repairs is too high, as the truck only cost \$45 in repairs up to the time that it was full depreciated.

The garage rental item is about the average for a smaller town. But the interest charge is too high. It is estimated on a flat 8 per cent basis, instead of on a decreasing basis, as the truck depreciated and was paid for in the depreciation item. Taking these differences altogether, however, they would about cancel each other and the final cost figure of \$1259.11 would be about correct.

The total cost of hauling ice for the corresponding 6 months of the year was \$1482.63, making a total yearly cost of \$2741.74. The ice cost 29 cents per ton-mile and about \$2.62 per ton, to haul.

### The Commercial Vehicle—Truck Cost System

Number of Truck *Selden*  
Capacity in lbs *1½-ton* Chassis No. \_\_\_\_\_

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK

#### Investment

Cost of chassis, less tires	\$ 2 085 00
Cost of body	
Cost of equipment	
Cost of tires	2 15 00
1—Total cost, complete	\$ 2 300 00

#### Performance Record

2—Days operated	120
3—Days idle	62
4—Days maintained Item 2—Item 3	182
5—Total hours operated	960
6—Total miles covered	3360
7—Total trips made	420
8—Total tons <del>or packages</del> or stops	1050

#### Performance Averages

9—Average miles per day maintained (Item 6—Item 4)	18.46
10—Average miles per day operated (Item 6—Item 2)	28
11—Average miles per trip (Item 6—Item 7)	8
12—Average tons, <del>stops or packages</del> per trip (Item 8—Item 7)	2.5
13—Average commercial ton miles, <del>package miles or stop miles</del> per trip	10

#### Recapitulation

14—Total expenses for month (Sum of Items A, B and C)	\$ 1259.11
15—Cost per day operated (Item 14—Item 2)	10.49
16—Cost per day maintained (Item 14—Item 4)	6.92
17—Cost per mile operated (Item 14—Item 6)	.375
18—Total commercial ton-miles, <del>package miles or stop miles</del> (Item 7×Item 13)	4200
19—Cost per commercial ton-mile, <del>package mile or stop mile</del> (Item 14—Item 18)	.2998
20—Cost per ton	1.1991

Considering that this truck operated only 271 days out of a possible 300, the final cost per ton hauled is not an unreasonable one. The truck covered 3360 miles in hauling coal and 5436 miles in hauling ice, a total of 8796 miles for the year. It made 420 trips in hauling coal and 302 trips in hauling ice. It carried 1050 tons of coal in 6 months and 566 tons of ice in the other 6 months. The difference is due to the longer run required for the ice

# The Better Way

## To Save Time in Truck Repair and Maintenance

### No. 497—Universal Jack Block

**T**HIS is a simple way to enable a driver or shop mechanic to make better use of a jack. Quite often it occurs that drivers while out on the road will find difficulty in raising the truck sufficiently high enough to accomplish a certain repair or will be unable to obtain the necessary purchase on the ground because of a slope, etc.

The accompanying illustration shows a home-made device that will enable a jack to be used at different heights. These blocks are made in step shape and can be used singly to allow two different heights or together.

There is also another use for these blocks, namely that of blocking the wheels. Stopping a truck or other vehicle is often attended with danger on account of failure of brakes to hold. A truck making deliveries in hilly country is often left alone while the driver is visiting some customer. Usually a stone is placed behind the wheels with the emergency brake on. Should something happen to force the stone away, the chances of an accident happening are all the more magnified. This block with its width will be handy under such circumstances.—M. SPENCER, New York City.

### No. 498—Battery Post Mold

**W**HEN making a battery post, difficulty is often encountered on account of being unable to get a perfect mold. A battery post mold may be made by bending a piece of tin to the desired shape, fitting the edges together well and burning the lead into the tin. If the tinning is burned off the tin first, the lead will not stick to it.—M. EASTBURN, Norristown, Pa.

### No. 499—Grip That Improves Screwdriver

**T**HE winding of the handle of a screw driver with tape is good practice, which makes the efforts of gripping the handle with greasy hands less tiring and facilitates the setting up solidly of screws.

However, a better method is to place a corrugated wooden rim over the ferrule of the driver 4 in. in diameter and 1 in. wide for use in the left hand. The advantages of this extra grip are appreciated when placing or removing a tight or rusted screw bolt. The driver can be twisted rapidly with the right hand, when free, but when extra force is required

**T**O help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

the rim permits of using the left hand and avoids tiring and straining the wrist of the right hand.—M. TODD, Chicago.

### No. 500—Putting Fullers Earth on Clutch

**W**HEN the clutch is slipping and it is necessary to apply Fullers earth, the usual method is to take the powder and squirt it bit by bit with a powder gun on the surface of the clutch. Though this method will serve as a remedy, the time consumed may be shortened by taking a piece of thin brass or copper tubing and flattening one end. Fuller's earth is put in the tube and a piece of rubber tubing attached to the round end. Depressing the clutch pedal and blowing through the pipe will blow a small dust cloud on the clutch.—G. CREEDE, Cleveland.

### No. 501—Sliding Repair Seat Under Raised Track

**H**ERE is a handy way in which to take care of repairs under a truck and it obviates the necessity of using a pit or other method. Truck mechanics have designed a number of devices for overcoming the difficulty and also the

discomfort encountered while working under a truck. One fleet owner has a wooden runway which is high enough for the mechanic to kneel under when working. The approach to the runway is such as to enable a truck to make the grade with ease.

The accompanying illustration shows a little more comfortable arrangement. In this case a raised track of I-beams is used and instead of kneeling, the mechanic is able to sit down on a traveling seat, which can be made up with stock door hangers, four long bolts and a piece of board.—J. NEFF, Syracuse, N. Y.

### No. 502—Inserting a Screw in Difficult Places

**H**OW many times have you been forced to reach down in some grimy place on your truck in order to get a good purchase on a screw with a screw driver? How many times have you done this only to find that your efforts have been of no avail simply because the screw driver would not hold the screw tight.

Inserting a screw may be made easier by fastening two pieces of clock spring in a slot in the end of a small rod which is held in a handle. The outward spring against the screw slot will hold the weight of the screw.—K. MACKSEY, Dover, N. J.

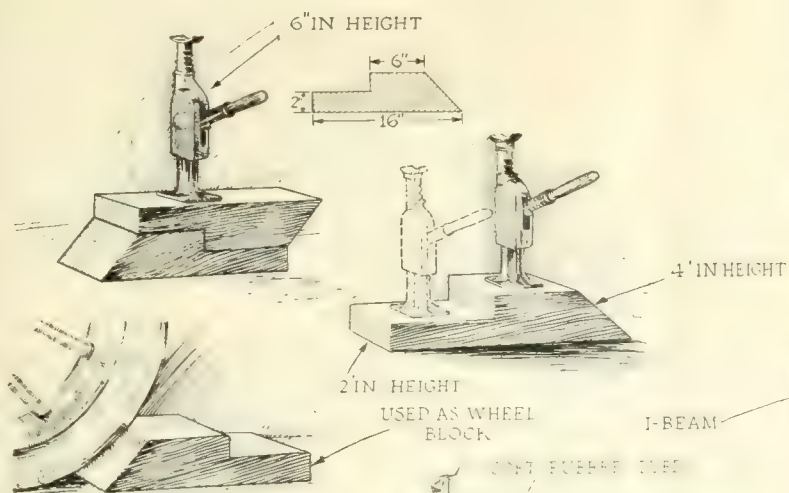
### No. 503—Radiator Cap Wrench

**A** WRENCH which will remove a stuck radiator cap without marring the metal is made from a piece of stick about 18 in. long, to the end of which is nailed a length of fan belt or brake lining. When the wrench is held as shown in the accompanying illustration, the friction will move the cap. This method may also be applied on other similar parts, such as a wheel hub cap, etc.—J. CONLIN, Newark, N. J.

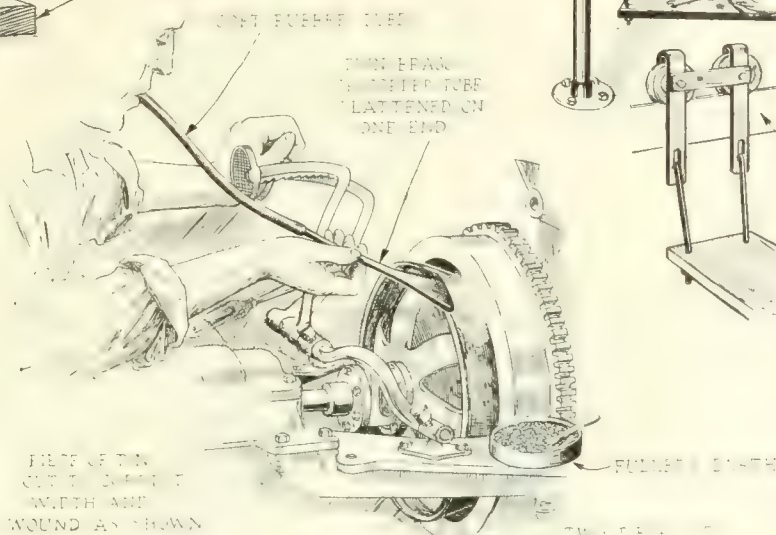
### U. S. Tire Technical Service Section

**A** TECHNICAL service has been established by the tire manufacturing department of the United States Rubber Co. for the benefit of users of United States tires either as original or ultimate equipment. The activities of this new section will be devoted to the solution of engineering and technical tire problems confronting highway engineers and truck owners. Headquarters will be at 1790 Broadway, New York City.

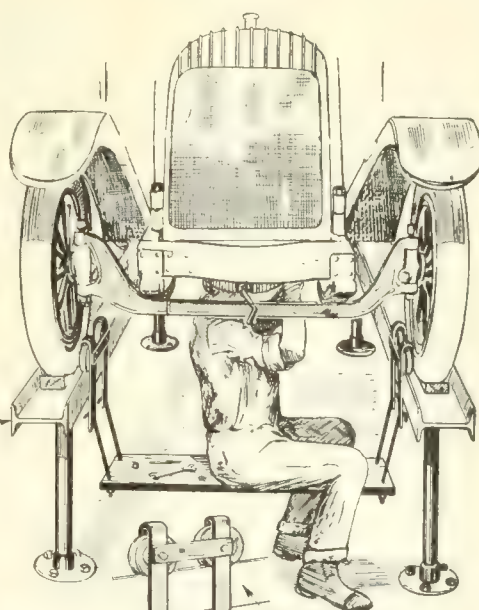




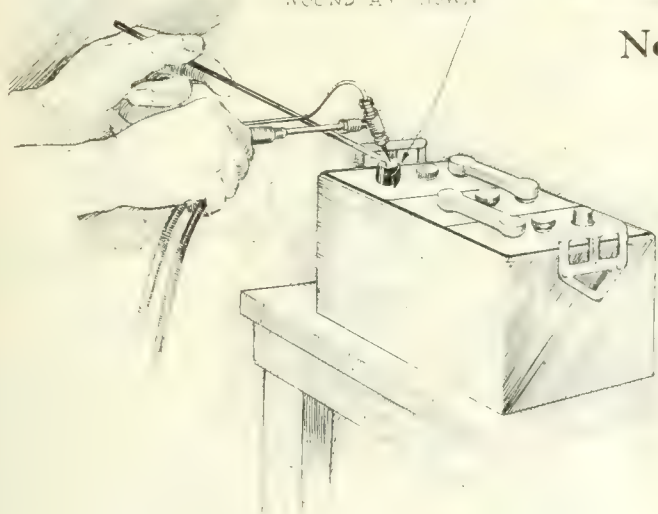
No. 497



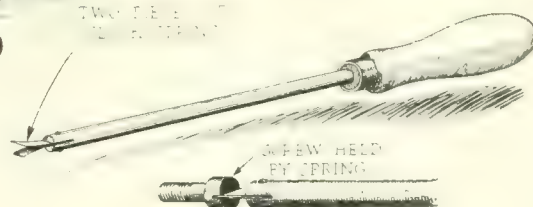
No. 500



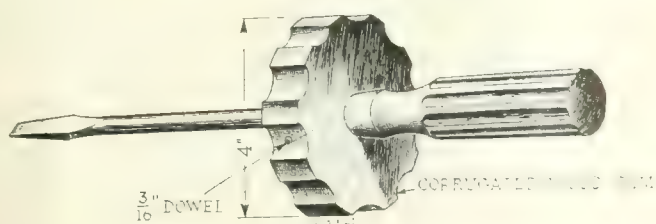
No. 501



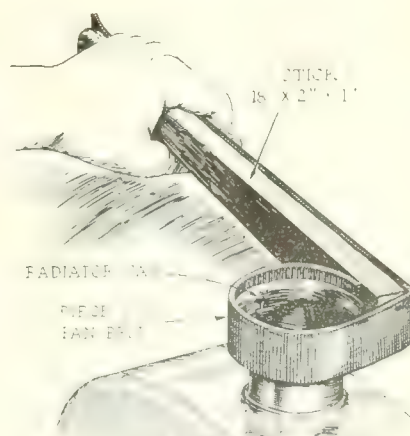
No. 498



No. 502



No. 499



No. 503

### No. 504—Hub Cap Thread Chaser

A THREAD chaser to clean out the inside threads of hub caps is made from a length of heavy spring wire bent to the shape shown in the accompanying illustration and sharpened on the ends. The points are made wedge-shaped to fit the threads.—H. WHEELER, Mt. Vernon, N. Y.

### No. 505—Removing Front Ford Spindle Bushings

THERE are a number of ways for removing the spindle bushings from the front spindles on Ford trucks, but one of the best ways is as follows:

Use a  $\frac{5}{8}$ -in. taper tap (any thread) and tap the bushing with it, that is, screw the tap into the bushing and then turn the spindle upside down. Then use an old spindle bolt to drive on the tap from the reverse end. The tightest bushing can be moved this way.—W. F. DAASCH, Muller Lumber Co., Davenport, Iowa.

### No. 506—Forcing Grease in Clogged Channels

WHEN the grease passage in a shackle bolt or other member becomes clogged so that a grease cup will not dislodge it, attach a pressure grease gun fitting, remove the ball check, and then replace the cup.—H. SMITH, Harrison, N. J.

### No. 507—To Prevent Belt Lacing Tearing Out

A GOOD way in which to prevent the belt lacing from tearing out is to strengthen the holes through which the belt lacing is pulled. Eyelets such as are used in shoes or to clamp papers together will serve the purpose. These are crimped into the holes in the belt before the lacing is put through. This prevents the lacing from tearing through the leather.—M. WALLACE, Norfolk, Va.

### No. 508—Rubber Tubing for Battery Filler

THIS device consists of rubber tubing, a bottle or jug and a rubber cork to fit airtight into the neck of the bottle. Simply insert the filler tube into the battery and blow through the air tube. When the desired height is reached, pinch the filler tube, stop the water, and insert into the next cell. Hang up the tube ends or handle the wire by a hook, or leave a loop in the wire and push the tubes through. To fill, insert the filler tube in the water jar and set it a little lower, allowing the bottle to fill by syphonic action.—T. WEBSTER, Elgin, Ill.

### No. 509—Truck for Carrying Gas Tank

THIS truck is made up of an axle, two wheels, a piece of board cut out to fit around the tank and two pieces of

strap iron which clamp the tank when the bolt is tightened. The design permits ease in changing from one tank to another.—R. BROWNE, Medford, Ore.

### No. 510—Structural Iron Trestles

TRESTLES formed out of structural iron are very light and can be easily moved about. They can be made in a great variety of shapes and sizes to suit individual requirements. The parts can

be welded or riveted.—L. FANNING Philadelphia.

### No. 511—Hook for Holding Autocar Seat Up

ON old Autocar trucks there is danger of the seat falling when a mechanic or driver is working under it. A hook or strap as shown in the accompanying illustration will serve the purpose of holding the seat up. This hook is attached to the hood and the steering wheel.—H. N. STEVENSON, Trenton, N. J.

### "What's the Use" Says I. Steeronly on Annual Overhauling; then learns the sad truth that "It Pays"

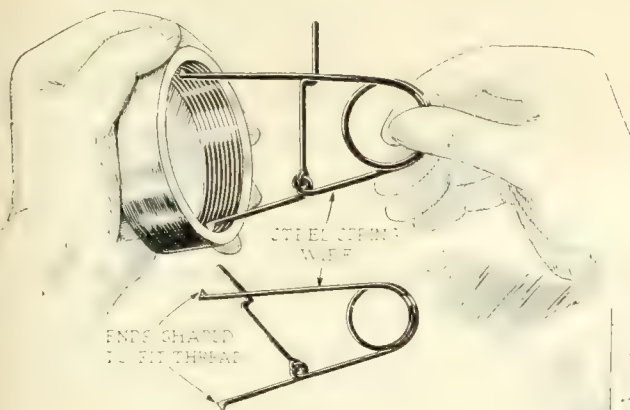


### Humor Brings Home a Real Fact

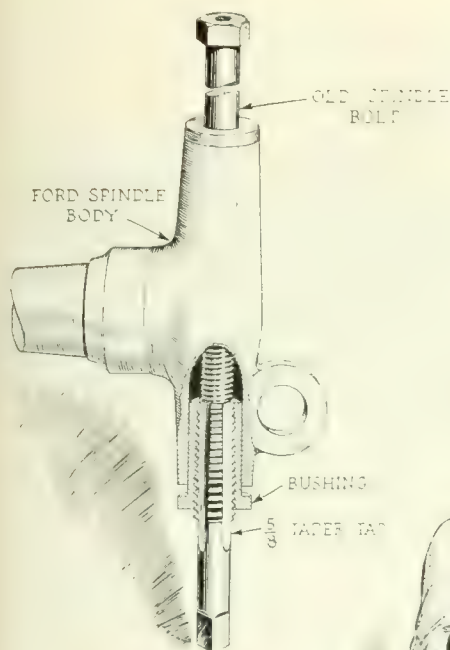
THE necessity of an annual overhaul and frequent inspection of a truck is known to most progressive fleet owners. But now and then one comes across an owner who is satisfied to run his truck just so long as it will go. In the end his investment, after a very short life, will be ready for the scrap heap and he will share the same sad experience that I. Steeronly has in the above illustrated story. These pictures are published by the Acme Motor Truck Co. in its house organ and depict in a humorous way points in the operation of trucks that may well be borne constantly in mind by fleet owners.

Getting the maximum value from a truck is largely a matter of maintenance versus depreciation. The life of a motor truck may be prolonged surprisingly with proper care and thorough inspection at stated intervals.

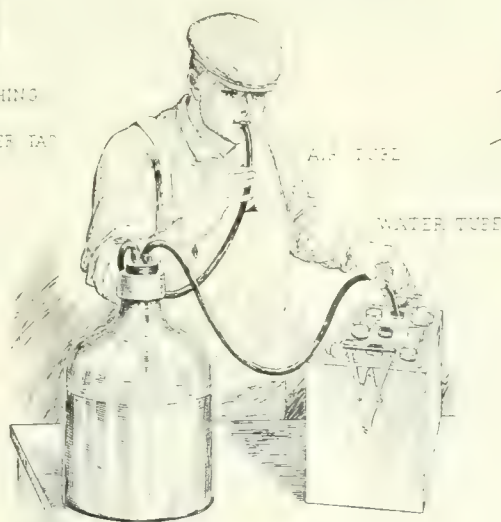




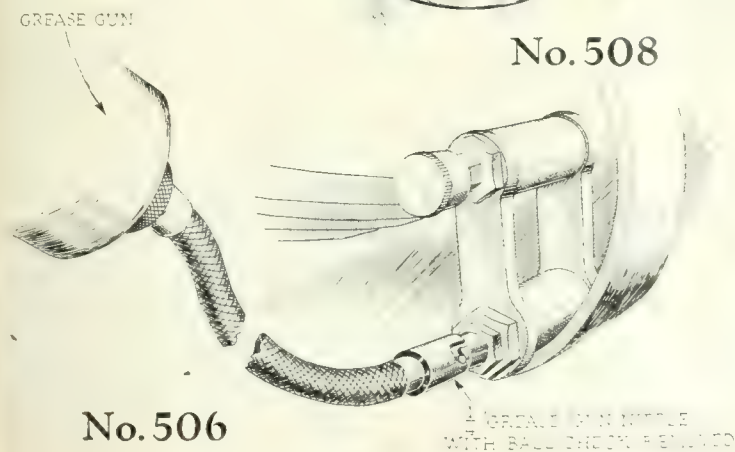
No. 504



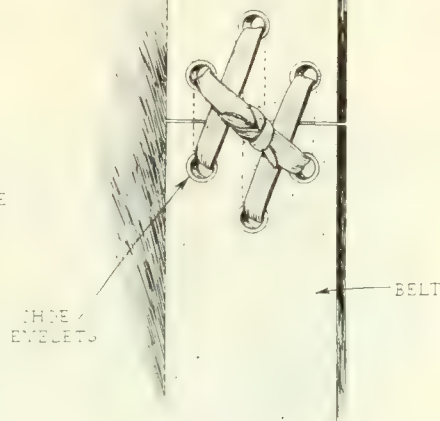
No. 505



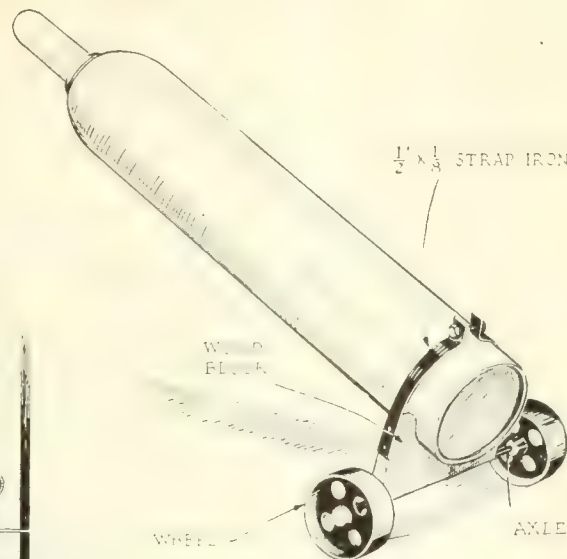
No. 508



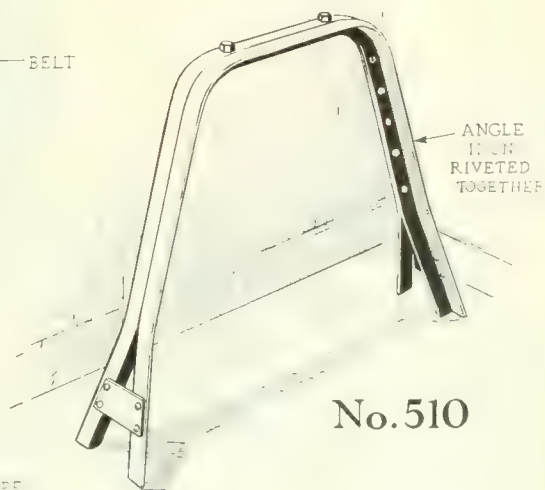
No. 506



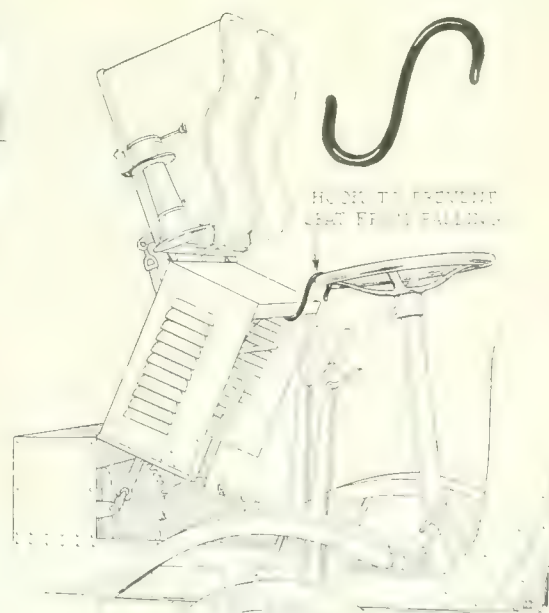
No. 507



No. 509



No. 510



No. 511

## Buyer's Department of The Commercial Vehicle

### New 2½-Ton Nash Truck for Road Construction

**Has 121-in. Wheelbase and May Be Equipped with Two-Batch Dump Body with Horizontal Hoist**

#### NASH SPECIFICATIONS

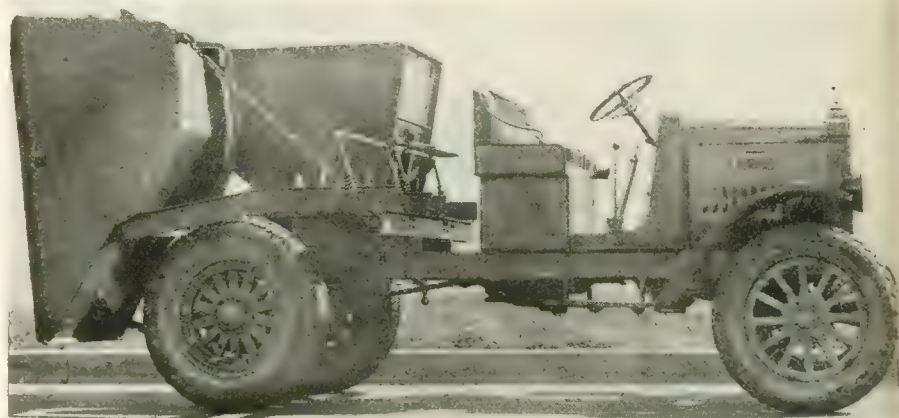
Capacity, tons	2½
Price	\$2,550
Wheelbase, in.	121
Tires, front	34 x 4
Tires, rear	34 x 6
Bore, in.	3¾
Stroke, in.	5¼
N. A. C. C. h.p.	22.5
Speed, r.p.m.	1,500
Speed, m.p.h.	18
Gear ratio in high gear	10:1
Final drive	Int. gear

THE new 2½-ton Nash truck built by the Nash Motors Co., Kenosha, Wis., has been designed to meet the requirements of highway construction. The truck has a wheelbase of 121 in. and in addition to road building work it is adaptable as well to service in other fields such as the hauling of coal or in any business where a short wheelbase truck is necessary.

The new model may be equipped with a two-batch dump body or with the conventional type of rear dump body with horizontal hoist which can be divided into two sections of equal carrying capacity. The "aggregate" or load may thus be dumped directly into the skip of the mixer, an advantage that is distinctly economical, for in shoveling from the ground to the mixer laborers frequently gather up large portions of surface dirt. It is claimed that a truck of this type will automatically eliminate as many as eighteen laborers on an ordinary road-building job in the feeding of the mixer.

The Nash 2½-tonner is equipped with pneumatic tires, which means that it will not tear up the subgrade. Its short wheelbase makes it possible for the driver to turn around on the subgrade, an advantage that appeals particularly to the road building contractor.

The maximum permissible weight on the chassis is 6350 lb., including the body, load and special equipment. The truck has a ground clearance of 9¼ in. under the rear axle with solid tires. The frame length back of the driver's seat is 76 in. The distance back of the driver's seat to the center of the rear axle is 51½ in.



*The new 2½-ton Nash is adaptable to service in other fields than road construction. It may be used for hauling coal or in any business where a short wheelbase truck is necessary*

The four cylinder Nash engine is of the L-head type, having a bore of 3¾ in. and a stroke of 5¼ in. The crankshaft bearings are all of the plain type. The front bearing has a diameter of 2 in. and 3¼ in. long. The rear bearing has a diameter of 2 in. and is 4½ in. long. The center bearing also has a diameter of 2 in. and is 2½ in. long. The bearings are of the heavy bronze shell type, babbitt lined.

The Simplex governor is of the centrifugal type with a grid valve. It is operated by a flexible shaft drive from the engine and cuts off at an engine speed of 1500 r.p.m.

Water is circulated by a centrifugal pump through a cast tank with a removable tubular core. The capacity of the cooling system is 5 gal.

A high tension Eisemann magneto takes care of the ignition. Lubrication is by a combination force feed and splash system. A plunger pump operates from the eccentric on the camshaft by a connecting link.

The Borg & Beck clutch is of the dry-plate type. The four-speed, selective Detroit gearset is mounted amidships, provision being made for the installation of an air pump and power takeoff.

The Clark rear axle is of the internal-gear type. Drive is from the shaft through the gearset to the bevel gear in the rear

axle and thence by a transverse shaft to the driving pinion meshing with the internal gear in each rear wheel. Drive and torque are taken through the springs.

Gear reductions from the engine to the rear wheels are as follows: First speed, 45 to 1; second speed, 31.4 to 1; third speed, 18 to 1, and fourth speed, 10.2 to 1.

The carburetor, of Stromberg design is of the plain tube type and is provided with a hot air intake. Fuel is fed by gravity from a 16-gal. tank.

The frame is of pressed channel steel and has a depth of 6 in. and a width of 16 in. The thickness is ¼ in. The length over all is 167½ in.; the width over all is 33½ in. at the rear and 28 in. in the front. The frame height is about 31 in. when the vehicle is loaded and equipped with pneumatic tires, 28 in. when solids are used.

The service brakes operate on the rear wheels and the emergency on the drive shaft. Both are of the external type. Solid tire sizes are 34 by 4 on the front and 34 by 6 on the rear. Pneumatic tires which are optional at extra cost, are 35 by 5 on the front and 40 by 8 on the rear.

Equipment includes Auto-Lite electric lighting and starting, driver's seat tools, horn and jack.



## Buyer's Department of The Commercial Vehicle

### Republic 3/4-Tonner a New Model

*Company Now Producing the Rapid Transit  
Equipped with a Lycoming Powerplant*

THE Republic Motor Truck Co., Alma, Mich., is in production on its new internal gear-driven Model 75, the Republic Rapid Transit, designed for speedy deliveries and sturdiness. It has a wheelbase of 124 in.

Standard equipment consists of a canopy top express body with open cab and curtains, electric lighting and starting, electric horn, headlights and tail-light, tire carrier with spare rim, complete tool kit, jack and tire pump. The price, completely equipped, is \$1,395, f.o.b. Alma.

The body is equipped with an adjustable ventilating rain-vision windshield. Body dimensions are as follows: Inside width, 44 in.; length, 8 in.; height, 53

in. in the clear; side panel, 13 in. high with a 4½-in. flareboard.

The weight of the chassis is 2500 lb. With the body and complete equipment the weight is 3100 lb. In addition to the canopy top express body, this model is furnished with a complete line of body types to suit all requirements in rapid transportation, notably the following: Open body, stock rack, double deck, carryall, screen enclosed, platform stake and panel. All body types are furnished with either open or enclosed cabs, according to specifications.

The new Republic model is equipped with a four-cylinder Lycoming engine which is cast in block with a detachable L head. The bore is 3½ in. and the

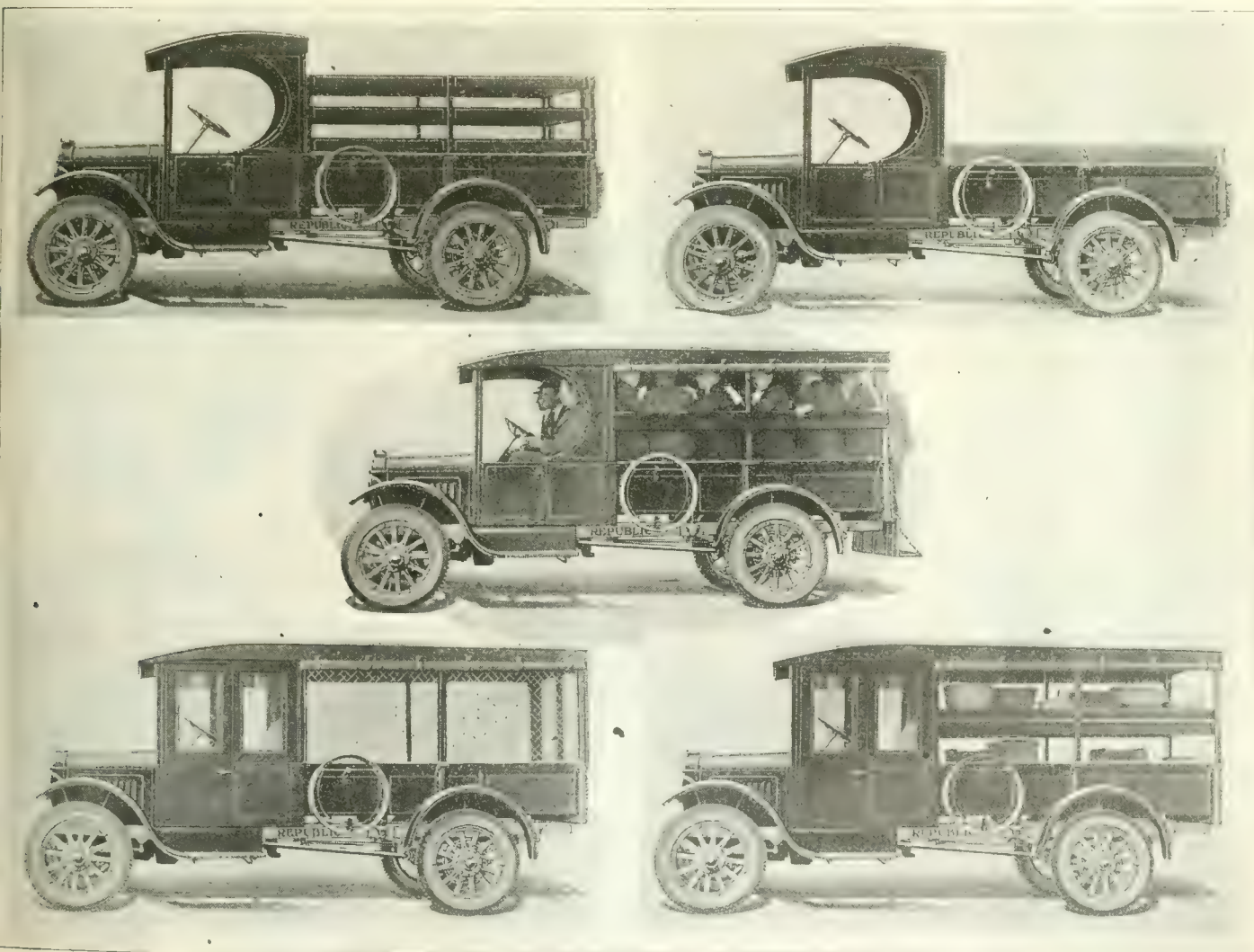
stroke 5. Water is circulated by a thermo syphon system through cellular type of radiator. The cellular core is removable. Gasoline is fed by vacuum from a 14-gal. tank under the seat.

The engine is mounted as a unit with the three-speed selective gearset. Drive is through a tubular propeller shaft with two universal joints, enclosed in a dust-proof housing. The clutch is of the multiple disk type, completely enclosed in a bell housing.

The springs are semi-elliptic and the shackles are of drop forged steel. The Hotchkiss drive system is used. The rear axle, which is of Torbensen design, uses roller bearings throughout.

Final gear ratios are as follows: First, 16.64 to 1; second, 11.15 to 1, and third, 6.3 to 1.

Pneumatic 32 by 4½-in. cord tires of the non-skid types are used. The wheels are of the artillery type, demountable, detachable rims being used. The brakes operate on the rear wheels.



*Five body types built especially for the Republic Rapid Transit*



# Buyer's Department of The Commercial Vehicle

## Self-Adjusting Bearing Bolt

THE Nonok is a self-adjusting bolt that automatically takes up the wear as it appears and does away with the rigid shimmed adjustment responsible for connecting rod knocks. Nonok gives an adjustment always tight and even that makes it impossible for the crankshaft to wear itself loose in the babbitt.

An adjusting nut is held tight against the bearing cap lug by the pressure of a compressed coil spring anchored, and adjusted for tension, at a lock nut. Under this pressure the adjusting nut travels upward on a steep-pitch, left-hand thread. It is irreversible in action. Nonok is made for any size bearing on any type of engine. The maker is the Automatic Bearing Co., 751 Otis Bldg., Chicago.

## Adamson Oil Cooler for Fords

THIS is a device for cooling the oil in the Ford engines. It consists of a pan which is provided with cooling flanges and which is bolted to the bottom of the engine crankcase in place of the present pressed steel inspection plate. The price is \$5. The maker is the Adamson Mfg Co., East Palestine, Ohio.

## Hub Odometer

THE hub odometer made by the H. W. Johns-Manville Co., New York City, records up to 100,000 miles. The mechanism is well protected by a heavy malleable iron hub cap. The instrument can be installed in a few minutes.

Every revolution of the wheel is recorded forward and backward. Through a reduction gearing, the revolutions of the wheel are transferred to an odometer movement inserted in the end of the hub cap. This odometer movement is made of brass with all wearing parts of steel. There are no flexible shafts, gears or brackets necessary. The company guarantees the odometer to be grease and oil proof and against defective material and workmanship for 1 yr. from date of sale. A special model is made for Fords.

## Mayer Jack

THIS jack has a capacity of 3000 lbs., is 10 1/4 in. high and lifts 6 3/4 in. The handle when extended is 31 in. long, making it convenient to operate without reaching under the truck. The jack weighs 9 lbs. and is no larger than the ordinary type of jack. The housing is cast in one piece, and the worm and gear screw is 7/8 in. cold rolled steel, fitted with ball bearings. There are no ratchets or springs. The price is \$6. The maker is the Victor Machine Co., 608 South Broadway, St. Louis, Mo.

## Truck Accessories

### Hi-Power Spark Plug

A COMBINATION spark plug with or without intensifier. The intensifier is formed between the spindle extending through the porcelain top and the wire which extends above the top of the core. This gap is inclosed in an airtight chamber. The sparking points are of nichrome, and are protected by the shell. A piece of coiled wire is furnished with each plug for closing the intensified gap if the ordinary type of plug is preferred. The price, \$1.50. The plug is made by the Protected Spark Plug Co., St. Louis, Mo.

### Eureka Demountable Battery

THE construction of this battery is such that only a screw driver and pliers are needed in disassembling and assembling it. No compound is used to seal the cell covers, the connectors are held on by nuts, and the terminals are screwed on. The prices are as follows: 6-volt, 11-plate, \$28.50; 6-volt, 13-plate, \$31; 6-volt, 15-plate, \$33; 6-volt, 19-plate, \$36; 12-volt, 7-plate, \$35, and 18-volt 7-plate, \$45.

The maker is the Storage Battery & Appliance Corp., Philadelphia.

### Dietz Radio Headlight for Trucks

DIETZ electric head and tail lights are designed especially for truck use. They combine rugged strength and lighting dependability. There are two pieces in the shell of the light. The body of the lamp is drawn from one piece of 18-gage cold rolled steel. The rim for the lens, which is screwed securely to the body of the lamp by four screws, is drawn from the same material and comprises the second piece. There are two sockets, which are spot-welded to the body of the lamp.

The reflector is parabolic in shape. It is non-rusting and highly nickel plated. The lens is of the deflecting type. It meets all anti-glare requirements. The connector is of the adjustable focusing type, complete with metal plug and is made of brass, nickel-plated, with single or double contact as desired. The two-piece feature is shown in the accompanying illustration, also the small lips or finger holds back of the screw holes in the rim of the lens which make removal of the rim easy. The maker is the R. E. Dietz Co., New York City. The price per pair is \$10.

### Vibra Automatic Oil Cup

WITHIN this cup there is an inverted pendulum which is operated by the vibration of the truck. The oscillations of this pendulum open the valve, thus feeding oil to the bearings. The cups are made with standard 1/8-in. pipe thread and are interchangeable with other cups. The price of each is \$1. The maker is the Vibra Engineering Co., 250 Atlantic Avenue, Camden, N. J.

### Acme Transmission Linings

A NEW lining for Ford transmissions has been placed on the market by the Potter Lovell Co., Potter Brook, Pa. It is said that this lining will not slip, grab, burn or ravel. It is also claimed that these linings are impervious to oil. These linings are furnished in sets of three, complete with rivets, ready for attachment. The price per set is \$3.50.

### Nojak

THIS device consists of a steel casting weighing about 6 lbs. and is attached to the wheel by means of bolts passing through two small holes bored in the felloe. After it is attached the vehicle is driven a few feet forward or backward until the wheel rises up on the Nojak. It may also be used as a square tire guard and a mud or sand hook. The maker is the Commercial Mfg. Co., 1489 East Fort Street, Detroit.

### Aniszye Hose Clamp

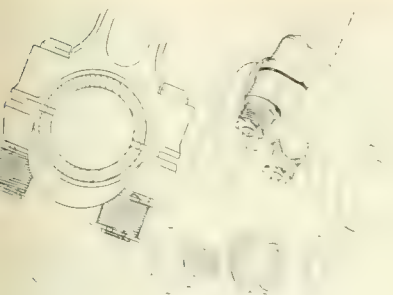
THESE clamps are made in two sizes which fit twenty-two different sizes of hose. Size A is adjustable from 7/8 to 2 in. diameter and size B from 2 to 3 in. They are made of galvanized steel and can be easily attached. Size A is packed in quantities of eighty and B in packages of twenty. The price is \$10 per package. The maker is the Tri-State Sales Co., 123 Leroy Street, New York City.

### Protex Signal

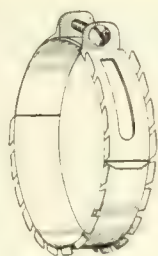
THIS signal warns trucks or other vehicles behind of the driver's intention to slow down, stop or turn, and thus avoid collision and accident. It is self-acting, wholly without thought, effort or consciousness on the part of the driver. Slight pressure on the brake pedal turns electric current into the signal lamp on the left rear fender and a bright penetrating red light flashes the warning letters "Stop" into the eyes of the driver following. This light remains on until the brake pedal is released. This signal is effective day or night. A brilliant light is secured by a reflector throwing the rays through patent lenses and thus intensifying the light. The maker is the Protex Signal Co., Park Bldg., Cleveland. The price is \$10 50.



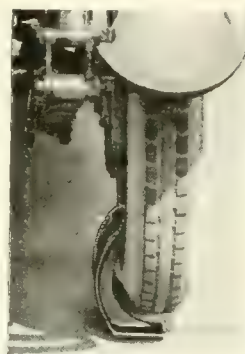
# Buyer's Department of The Commercial Vehicle



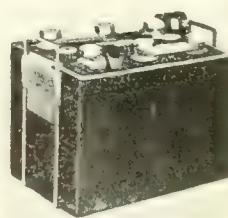
Nonok self-adjusting bearing bolt



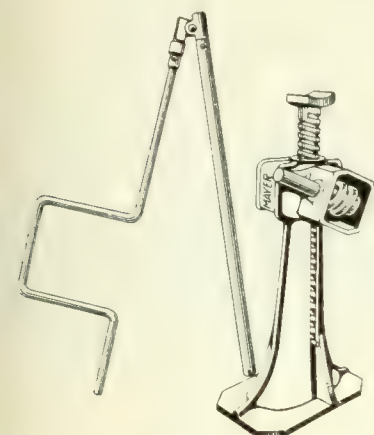
Anisyze hose clamp



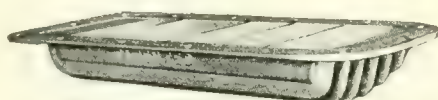
Nojak



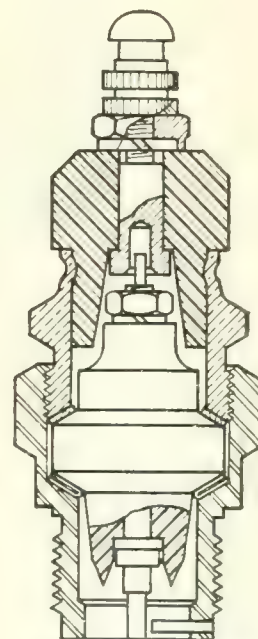
Eureka battery



Mayer jack



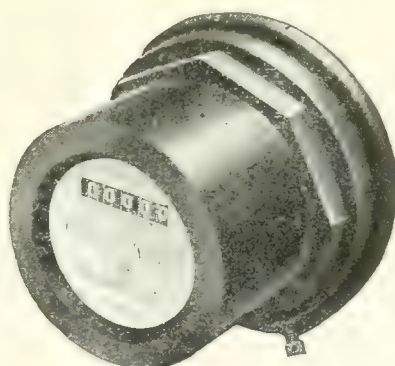
Adamson oil cooler for Fords



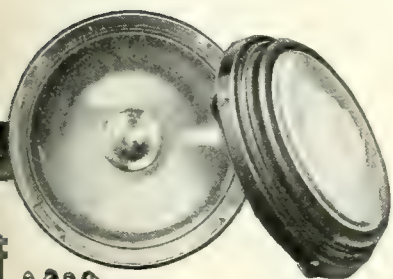
Hi-Power spark plug



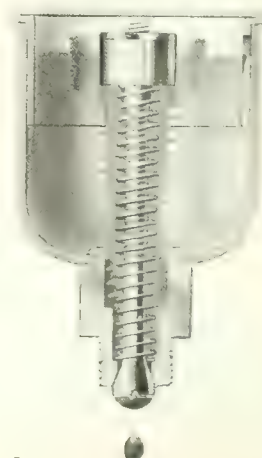
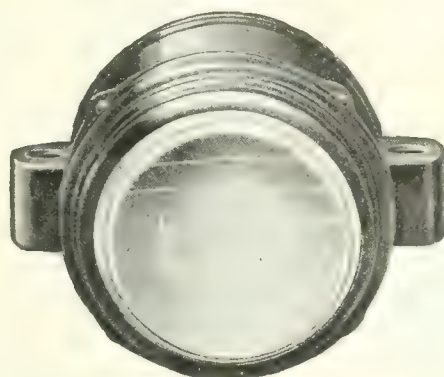
Protex signal



Hub odometer



Dietz radio headlight



Vibra automatic oil cup

# Buyer's Department of The Commercial Vehicle

## Van Dresser Reboring Tool

A NEW cylinder reboring tool is being put out in Detroit, which is so designed that the usual guide rings are eliminated and at the same time true centering is positively secured. Included in the refinements of this reboring tool, which is known as the Van Dresser and sold exclusively by the International Purchasing & Engineering Co., Detroit, are the hardened and ground feed bar, without threads, a 9¼-in. bearing with the lower bearing close to the cylinder bore to secure rigidity, and a long, ground taper shank on the reamer head to assure centering of the reamer head with the feed bar.

The spiral reamer blades are made of high speed steel, ground on all sides and so arranged as to be adjusted in unison from the lower end without removing reamer head from the feed bar. In order to eliminate feed marks on the cylinders after the reboring operation has been completed, there is a patented, slow moving feed mechanism which is constant, thus eliminating the intermittent motion which causes the feed marks to occur. With the Van Dresser reboring tool, it is optional with the operator to use either a drill press feed or feed provided for in the tool. The most satisfactory results are obtained by using a drill press in connection with the reboring of the cylinders, as the steady, strong feed of the drill press assures a smoother bore than it is possible to obtain with hand operation.

A floating driving socket is provided that automatically takes care of any misalignment of the drill press with the reboring tool. There is also an extension bar for drill presses not having sufficient spindle travel.

In place of the threads which are ordinarily on the feed bar, there is a small rack which gives it practically a 100 per cent bearing surface. This arrangement is also designed to make it unnecessary to turn the bar in order to remove or back up the feed bar. The mechanism on the rack cut-in-bar can be simply released and the feed bar pulled straight out or dropped through the bottom of the cylinder, whichever is convenient. The feed machine can thus be disconnected when used in operation on a drill press, as explained.

The reboring tool can be removed without disturbing the base, which has been centered separately over the cylinder bore. This allows the operator to try the fit of the piston before boring all the way through, and if another adjustment of the reamer blades is necessary, the boring tool when reinserted will automatically be absolutely central with the unfinished bore. This prevents any possibility of the new boring being eccentric with the work already done. Electric attachment is also provided for the

## Shop Equipment

tool. The prices of the tool f.o.b. Detroit range from \$142.50 for the No. 1 size, which has a capacity of 2¾ to 3¾, up to \$216 for the No. 7 size, which has a capacity of 2¾ to 4½ in. bore.

## Hoerner Valve Seat Facer

THE cutters of this tool are made of hardened tool steel and are as strong and accurate as a solid facer. It is claimed that this tool takes the place of ten separate tools, which would otherwise be necessary. The knives are adjustable to any size rod. The pilot stems are interchangeable and will fit any size valve stem accurately. This tool is made in two sizes, No. 1 costing \$12 and No. 2, \$20. The maker is the Hoerner Mfg. Co., 3929 Moneta Avenue, Los Angeles, Cal.

## Phoenix Burning-in and Running-in Machine

THIS machine is said to burn-in and run-in all makes of truck engines. It has a three-to-one gear reduction giving a burning-in speed of 200 r.p.m. and a running-in speed of 600 r.p.m. The pulley serves both as a flywheel and pulley and weighs about 500 lb. It has a three-to-one gear reduction giving a burning-in speed of 200 r.p.m. and a running-in speed of 600 r.p.m. The pulley serves both as a flywheel and pulley and weighs about 500 lb. It occupies a space of 29 by 78 in. and the height is 34½ in. A Fordson adapter is furnished. Special adapters for other makes of engines are furnished at \$50 extra. The complete price is \$600. The maker is the Phoenix Mfg. Co., Eau Claire, Wis.

## Rock Island Autovise

THIS vise has been designed especially for truck repair work. It has the regular jaws for all kinds of machinists' work, pipe jaws for holding pipe and rods, and can also be used as an anvil. It is made with both stationary and swiveling bases. It is made with either 3 or 4-in. jaws. The maker is the Rock Island Mfg. Co., Rock Island, Ill.

## Norman Piston Ring

THIS is a one-piece, flexible, self-adjusting, hammered ring. The hammering is done with specially built machinery with more force opposite the joint than near it. This is stated to produce a more permanent elasticity and gives it an even pressure against the cylinder wall at all points.

The company tempers it in crude oil furnace. The super joint is constructed

of fillets and rounding ends, making it very flexible. The projecting end, called the tongue, is rounded so it will slip by the opposite end without catching. This also prevents oil from accumulating on the inside of the joint. The peculiar construction of this makes it always tight.

The maker is the Norman Piston Ring Corp., Peoria Heights, Ill.

## Reliable Battery Carrier

THIS carrier operates on the principle of tongs; the arms have hooks, which are put on the handles of the battery. The price is \$1.13. The maker is the Reliable Mfg. Co., Cleveland.

## Kerrihard Grinding Stand

THE shaft of this machine operates in babbited bearings which are fitted with spring oilers. It takes a wheel up to 18 in. in diameter by 3 in. face. It is especially adapted for working on irregular shapes. It can be furnished in a tight and loose pulley if desired. The height is 34½ in. and the weight 220 lb. The maker is the Kerrihard Co., Red Oak, Iowa.

## Heitz Hydraulic Press

THIS press develops pressures as high as 65,000 lb. It is 6 ft. 6 in. high and the width between the uprights is 26 in. The distance from the cross bar to the ram is adjustable from 18 in. to 42 in. The ram is 4 in. in diameter and has a 7-in. vertical travel. The maker is the L. R. Heitz Garage, Muscatine, Iowa.

## Ambu Separator Remover

THIS tool is designed so as to give ease in slipping it in between the battery plates and separator. The teeth side of the blade is next to the separator. A pull brings out the separator with the blade. The price is 75 cents. The maker is the American Bureau of Engineering Inc., Chicago.

## Ambu Battery Box Scraper

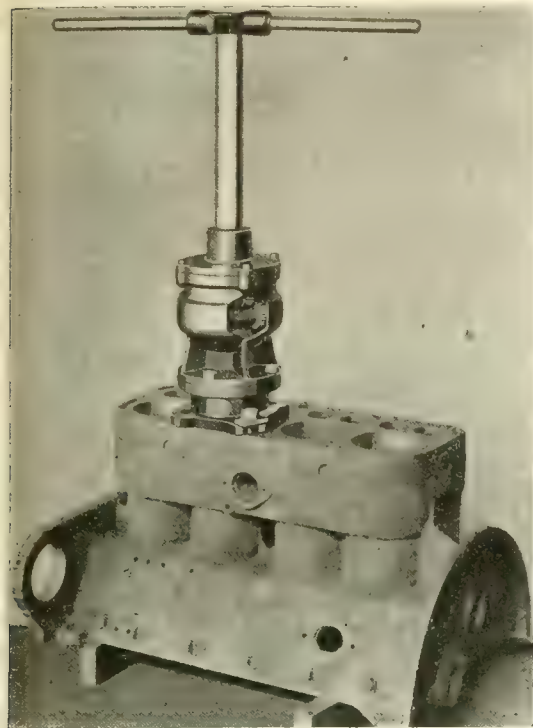
THE Ambu battery box scraper is the latest repair tool designed by the American Bureau of Engineering, Inc. Chicago. This tool will be found useful in removing compound in battery boxes as well as in a dozen other ways in the battery shop. The price is 50 cents.

## Phoenix Connecting Rod Aligning Gage

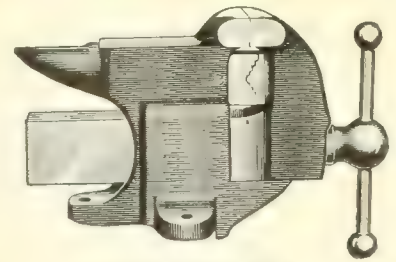
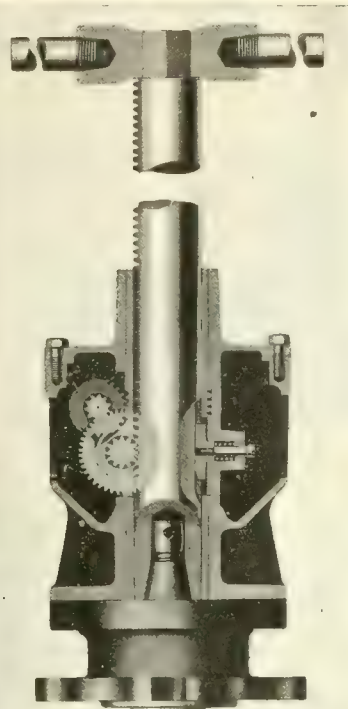
THE testing arbor of this tool ground to a diameter of 1¼ in., and three ground bushings are furnished as follows: 1¾ in., 2 in. and 2¼ in. The bushings slip on the testing bar for different sizes of connecting rods. The price is \$30. The maker is the Phoenix Mfg. Co., Eau Claire, Wis.



# Buyer's Department of The Commercial Vehicle



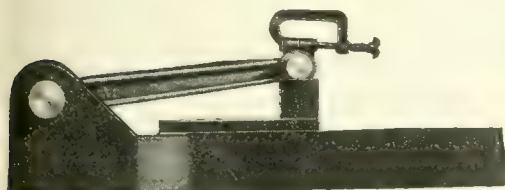
*Van Dresser Reboring Tool*



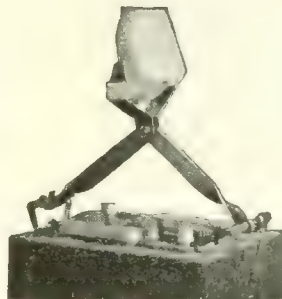
*Rock Island Vise*



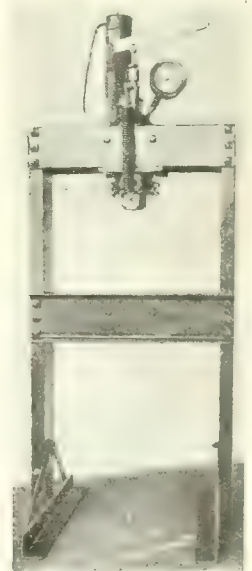
*Kerrihard Grinding Stand*



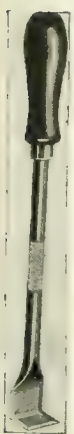
*Phoenix Connecting Rod*



*Reliable Battery Carrier*



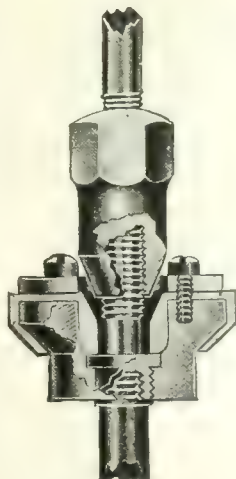
*Heitz Press*



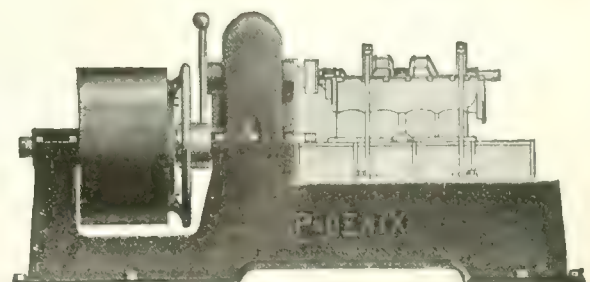
*Ambu Battery Scraper*



*Ambu Separator Remover*



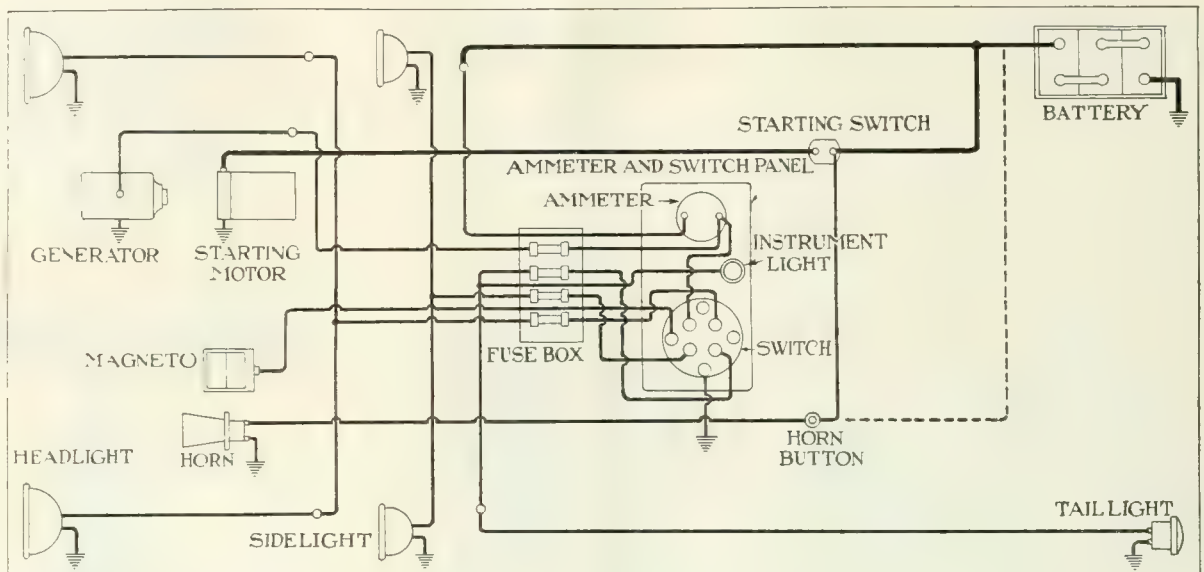
*Hoerner Valve Seat Facer*



*Phoenix Burning-In Machine.*

# Motor Truck Electric System Wiring Diagrams

## 28—Starting and Lighting Unit on Oneida Trucks



Wiring diagram illustrating starting and lighting system as used on all of the Oneida truck models. The generator, starting motor, horn and lights are grounded through their brackets

### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE.

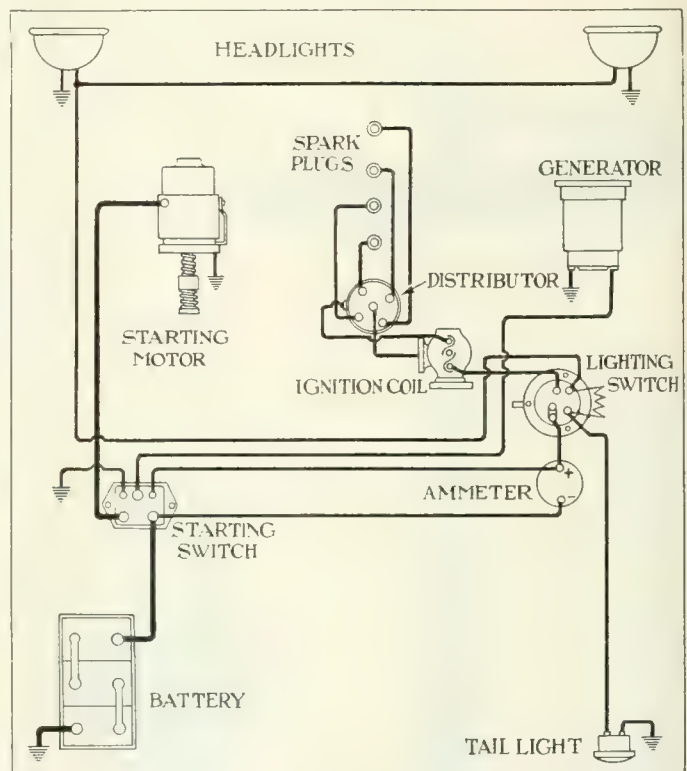
#### 1920

- 1—Ford, Starting and Lighting.....Oct. 1
- 2—Acme, Lighting.....Oct. 15
- 3—Bethlehem, Starting and Lighting.....Oct. 15
- 4—Atterbury, Lighting.....Nov. 1
- 5—Ace, Starting and Lighting.....Nov. 1
- 6—Atlas, Starting and Lighting.....Nov. 15
- 7—Briscoe, Starting and Lighting.....Nov. 15
- 8—Defiance, Starting and Lighting.....Dec. 1
- 9—Commerce, Starting and Lighting.....Dec. 1
- 10—Grant, Starting and Lighting.....Dec. 15
- 11—Brockway, Starting and Lighting.....Dec. 15

#### 1921

- 12—Maxwell, Lighting.....Jan. 15
- 13—International, Starting and Lighting.....Feb. 1
- 14—Mack, Starting and Lighting.....Feb. 15
- 15—Vim, Starting and Lighting.....Mar. 1
- 16—Oldsmobile, Starting and Lighting.....Mar. 15
- 17—Reo, Starting and Lighting.....Apr. 1
- 18—Sterling, Starting and Lighting.....Apr. 15
- 19—Stewart, Starting and Lighting.....May 1
- 20—Kelly-Springfield, Starting and Lighting.....May 15
- 21—Riker, Starting and Lighting.....May 15
- 22—U. S., Starting and Lighting.....June 1
- 23—Wilcox, Lighting.....June 1
- 24—Pierce-Arrow, Starting and Lighting.....June 15
- 25—Republic, Starting and Lighting.....June 15
- 26—Parker, Starting and Lighting.....July 1
- 27—Noble, Starting and Lighting.....July 1
- 28—Oneida, Starting and Lighting.....July 15
- 29—Oshkosh, Starting and Lighting.....July 15
- 30—Knox, Starting and Lighting.....Next Issue
- 31—Master, Lighting.....Next Issue

## 29—Starting and Lighting Unit on Oshkosh Truck



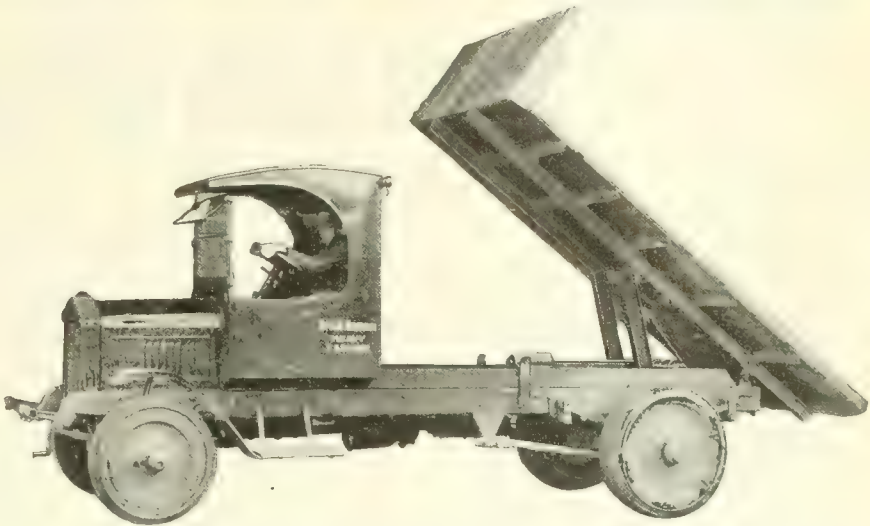
Wiring diagram of the starting and lighting system as used on the Model A Oshkosh truck



# Buyer's Department of The Commercial Vehicle

## Mechanical Hoist Saves Space

**Perfection Hoist Mounted Under the Body and Does Not Project Below the Frame of the Truck**



*Perfection mechanical hoist with body lifted*

A MECHANICAL hoist that enables a fleet owner to utilize all of the space on his truck chassis has been placed on the market by the Perfection Hoist and Engine Co., Milwaukee, Wis. The hoist is under the body and does not project below the frame of the truck. The mechanical features are such as to insure positive raising action at all times, regardless of conditions. The body may be raised and left for any length of time from 1 to 45 deg. angle. The self-locking feature of the screw gives this advantage.

The horizontal screw, which raises and

lowers the load, revolves in either direction desired and is under instant control at all times. Heavy steel cables are attached to the arms that raise or lower the body, which insures positive operation.

The hoist has an automatic stop at each end of its stroke and can be thrown in or out at any time during its operation. It can also be operated while the truck is in operation. All parts of the hoist are assembled on a steel frame, as a self-contained unit and can be installed in any make of truck.

The bracket contains no rivets; it is

bolted with S. A. E. bolts and all surfaces that fit against the hoist are machined. Every bearing has a bronze bushing provided with an oiler.

The screw is thoroughly encased, preventing injury from dirt or dust.

The hoist is made in three sizes; Model 2T will carry 1 to 3 tons and costs \$330; Model 3 T will carry 3 to 5 tons and costs \$360; Model 5T will carry 5 to 8 tons and costs \$450.

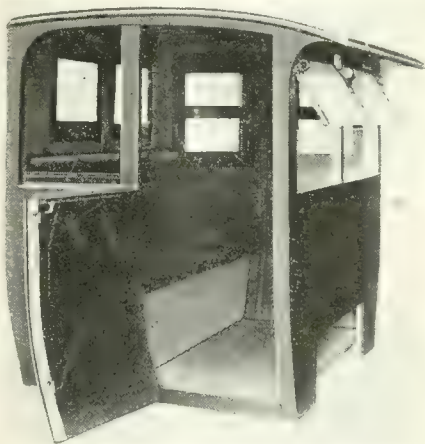
Hinge pins for all models cost \$1.50 per set; hinge brackets for all models cost \$20 per set; body guides for all models cost \$2.50 per set.

## Standardized Truck Cabs a New Wilson Product

*Manufactured in Sections on Quantity Production Basis—  
Comfort of Driver a Prime Consideration in Design*

STANDARDIZATION of truck cabs and bodies is a recent achievement of the Wilson Body Co., Detroit. Both cabs and bodies are manufactured in sections, on a quantity production basis, to fit any chassis design. There are two types of cabs, the open cab, with swing doors and curtains, and the closed cab, with sliding doors and glass windows. The line comprises two sizes, a 1- to 2-ton and a 3½- to 5-ton. Either size comes in the open or closed types.

The Wilson company is just starting to develop this business and so far its dealings have been entirely with manufacturers. What it is planning is to build these cabs and stock them in sufficient quantity so that the company can take care of any orders from one to 100. In other words, it will be possible for fleet owners to buy these cabs at some future date.



*Open type of Wilson truck cab with swing doors, curtains and windshield. A closed cab is also made*

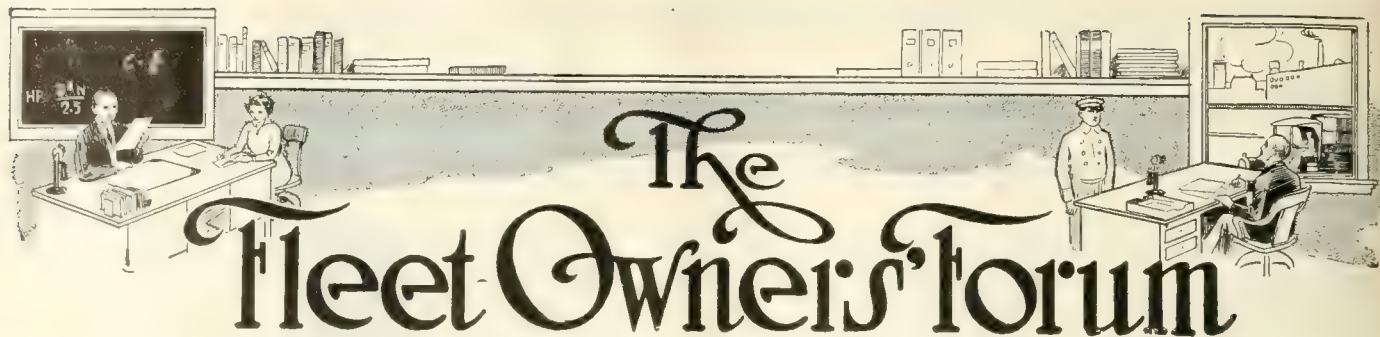
The truck bodies are rigidly built upon steel frames with hardwood panels. Both the cabs and bodies are shipped "knocked down" at a great saving in freight charges.

As all types and sizes are assembled on standard fixtures, it is not necessary to carry an expensive stock of special parts. Final assembly is a simple operation and can be performed by an unskilled workman.

As both types of cabs are furnished in priming coat, they are ready for final paint the moment they are set up in the shop.

Considerable attention has been devoted in designing the cabs to increasing the efficiency of the driver. Their rugged steel construction assures his safety and the seat and back cushions add to his comfort while at work on a particularly rough road.





## Determining When to Remove a Worn Solid Tire

To the Editor, COMMERCIAL VEHICLE:

How do you determine when to remove a worn solid tire? If a tire is kept in place until it is worn down almost to the top of the edge of the steel base, have you found that greater vibration has resulted and consequently greater repairs?—W. CROSBY, Milwaukee, Wis.

We know of one prominent fleet owner who removes the Goodrich De Luxe tires on his trucks when they have worn down evenly to a line across the tire drawn at a point 1 in. above the edge or top of the steel tire base. The depth of the rubber of the tire when worn down to the point when it is removed is measured from the top of the edge of the steel base instead of from the line of joining of the resilient rubber and the hard rubber base because the measurement taken from the top of the rim can be made more easily.

This owner pays closer attention to the tires on the front wheels of his trucks than he does to those on the rear wheels because of the fact that the entire engine with all of its delicate mechanism is carried principally by the tires on the front wheels. In no case is a front tire permitted to run after it has worn down to the point 1 in. above the rim of the steel base, although in emergencies rear tires may be worn down a trifle below that point.

It is unsafe in the case of the front tire because when going over rough roads it is possible that the rim of the tire base may come into contact with the ground and thereby impart shocks which will be transmitted direct to the engine, frame, springs, steering gear mechanism and the front wheel bearings. More chances are taken in running rear tires after the maximum wear has been reached because of the fact that duals are used and the second tire of the dual will get the truck home if the other tire be destroyed.

No difficulties in making adjustments have been experienced by this fleet owner when tires have been taken off when worn down to the line 1 in. above the edge of the steel base for the simple reason that in every case such tires have always given much more than the guaranteed mileage.

Tires which do not give their guaranteed mileage fail to do so because of one of two reasons, of which the first is a defective tire and the second, improper care on the part of the truck driver. What adjustments he had to have

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

made have been due to the tire breaking loose from the base rather than wearing down evenly so quickly that the guaranteed mileage was not secured.

When the tire has been worn down to the point of maximum wear, it is taken off and turned in at the nearest service station which sells the rubber still remaining in the steel base and makes an allowance of from 50 cents to \$1 per tire.

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

## Reader Interested in Truck Insurance

To the Editor, COMMERCIAL VEHICLE:

Please give me some points on insuring my trucks. I understand that you have published an article covering most of the points that a truck owner should know. If you have, what issue did this article appear in?—L. R. ROBINSON, Washington, D. C.

The article you refer to appeared on pages 14 and 15 of the July 15, 1919, issue of THE COMMERCIAL VEHICLE. This story takes up the question of whether a truck owner should insure in a stock company or in a mutual.

## Practical Way of Repairing a Ford Differential

To the Editor, COMMERCIAL VEHICLE:

Have you ever published an article covering the repair of a Ford differential? I would like some practical suggestions on how to disassemble, inspect and assemble this unit.—F. HALL, Weathersfield, Conn.

What you desire appeared on page 396 of the July 15, 1920, issue of THE COMMERCIAL VEHICLE.

## Reader Has Trouble Keeping Drivers

To the Editor, COMMERCIAL VEHICLE:

Have you ever published at any time a story dealing on the best way to pick drivers who will stay on the job? I have been unlucky in getting men who will remain in my employment long enough to give me the benefit of the training they have received at my establishment. Is there any set standard that I can adhere to in selecting my men or must I trust to luck?—READER.

Probably the experience of Albert E. Amos, manager of the Broadway Department Store, Los Angeles, Cal., will help you in the solution of your problem. Mr. Amos has gone into the truck driver subject very thoroughly. His ideas are brought out in a story entitled "How to Pick Drivers Who Will Stick," which appeared on page 110 of the March 15, 1920, issue of THE COMMERCIAL VEHICLE.

## Packard Holds Coast-to-Coast Truck Record

To the Editor, COMMERCIAL VEHICLE:

What is the record for a coast-to-coast trip by truck in the United States and what truck made it? I would also like to know what route was used.—R. SHANE, Flemington, N. J.

The world's record for a coast-to-coast trip by motor truck was established by a Packard in June, 1920, in 13 days, 13 hrs. and 15 min. The entire trip was made on one set of pneumatics; no changes being made. The previous record made in 1918 by a Maxwell truck stood at 17 days and 3 hrs.

The truck left Los Angeles, Cal., June 7 at 10 a.m. Its route was as follows: Needles, Cal., June 8, 5 a.m.; Kingman, Ariz., June 8, 1 p.m.; Seligman, Ariz., June 9, 8 a.m.; Albuquerque, New Mex., June 12, 7 p.m.; Trinidad, Col., June 14, 7.30 a.m.; Dodge City, Kan., 3 a.m., June 15; Kansas City, Mo., June 15, 11 p.m.; St. Louis, Mo., June 17, 8 a.m.; Springfield, Ill., June 17, 6 p.m.; Indianapolis, Ind., June 18, 8 a.m.; Springfield, Ohio, June 18, 5 p.m.; Akron, Ohio, June 19, 8.30 a.m.; Pittsburgh, June 19, 5 p.m.; Chambersburg, Pa., June 20, 8.30 a.m.; Harrisburg, Pa., June 20, 12 noon; Reading, Newark, New York, June 20, 11.15 p.m.

Outside of Albuquerque, New Mexico, high water of the Rio Grande necessitated considerable detouring, culminating in the breaking of a bridge over an irrigation ditch.



Body for Carrying 2½ Tons of Ice

To the Editor, COMMERCIAL VEHICLE:  
Will you give us specifications for building a body to carry as much as 2½ tons of ice and to be mounted on a 2-ton Nash pneumatic-tired truck. We also want the size of timber necessary to carry this weight, and other specifications needed in building such a body.—J. MUCHMORE, Summit, N. J.

For a truck of 2-ton capacity for such work, a body of the closed-panel type, with a separate cab, might be the most advantageous. A body of such design could be installed on this truck with a clear loading space of 45 in. breadth, by 126-in. length and any desirable headroom. The floorspace of this platform would accommodate seventeen 200-lb. blocks of ice, assuming the blocks to be of the standard size, 10 by 20 by 36 in. Seventeen of these blocks would produce a net load of 3400 lb., this figure, of course, being increased by building the blocks up on top of each other.

The material to be used in such a body should be as follows:  
Side, front and rear body sills made of 1½ by 8-in. No. 1 oak. Flooring to be made of 1½-in. North Carolina pine. Side panels of white wood. Stakes of hickory or No. 1 oak. Roof of ¾ by 2½-in. tongue and groove white wood.

Washing of Parts During Overhauling of Trucks

To the Editor, COMMERCIAL VEHICLE:  
What is the best way to wash the parts of my trucks during overhauling?—K. F. LANE, Kenosha, Wis.

You can use one of three methods for washing your parts, namely: Air pressure, tank, or wash stand. The air pressure system of cleaning, as used by the Atlantic & Pacific Tea Co., Jersey City, N. J., was described in the Oct. 15, 1919, issue of THE COMMERCIAL VEHICLE; the tank method as used by George Heron of Chicago was described in the Oct. 15, 1919, issue; the washstand, as used by the Motor Haulage Co., New York City, was described in the June 1, 1919, issue of THE COMMERCIAL VEHICLE.

By the use of compressed air in combination with soapy water, it is possible to clean the under portions of the chassis in a minimum of time. Compressed air used alone is useful in cleaning such parts as engine crankcases, bearings, etc. In cleaning the chassis with compressed air and soapy water, a small tank is used as a container for the solution. The tank, which is portable, is equipped with a 10-ft. flexible hose for the fluid and an air hose leading from the main line to the tank. Both pieces of hose are connected to the tank at the top. The vital part of the tank and that which is responsible for the atomizing or spraying action set up is a ¾-in. pipe inside the tank through which the fluid is fed to the hose. At the top of this pipe is a 3/16-in. hole, located above the upper level of the fluid. A certain amount of air escapes from the air hose through to this small hole, thus setting up an atomizing action. Without this hole, the com-

pressed air would force a solid stream of fluid up through the pipe and onto the truck.

A simple tank for cleaning engine parts and chassis units when they are taken out of the truck for repair, consists of a table-like top supported on four 2 by 2-in. legs with the top about 36-in. from the floor or at a height most convenient for the average mechanic. The top of the table has a slight incline at the lower end of which is a trough in which the kerosene used for cleaning the parts is poured. In actual operation, the part to be cleaned is laid upon the inclined table and the kerosene dipped up out of the trough on a piece of waste or an ordinary paint brush. After the kerosene has been used to wash off the parts, it drains back into the trough which is provided with a drain pipe in the bottom so that kerosene which has collected dirt during the washing operations may be drawn off and clean kerosene substituted.

Uniforms for Drivers

WHAT are your views in regard to the use of drivers' uniforms?  
Have you found that it pays, and if so, why?  
Are there any disadvantages?  
How is the cost of the uniforms covered?  
This is a good subject for discussion.

Let Us Hear from You

Another convenient way of cleaning parts is by the use of a washing stand provided with a trough running around the edge with a flat surface in the middle where large parts are washed by hand. Small parts are dipped in the trough which contains kerosene. A drain is provided in the bottom of the trough and the kerosene changed whenever sufficient sediment has collected to warrant doing so. The trough is 4 in. deep.

Advantages of Uniforms for Drivers

To the Editor, COMMERCIAL VEHICLE:  
What are the advantages of equipping drivers with uniforms and how should the cost be covered?—H. P., Brooklyn, N. Y.

The uniforming of motor truck drivers has two important advantages. In the first place it adds distinction to the equipment of the concern. In the second place, it makes the drivers neater with themselves and a driver who is neat with himself is generally neat with his truck. A driver who is neat with his truck is generally the one who has the least cost of repairs charged against him. Nine times out of ten, a slovenly man in his appearance is also slovenly in the care of his truck and as a result it does not receive the care to which it is entitled.

The Boston Store, Chicago, provides suits for the drivers of its electric trucks. The suits consist of whipcord coat and a hat, but no trousers. They are given to the driver without cost to him and last from 1 to 1½ years. The same

suit is used winter and summer, no overcoats being furnished in the winter. Instead, the coats are large enough to permit the driver to wear a sweater underneath them in winter weather. This has proved satisfactory, in view of the fact that a coat, if not of the pea-jacket type, often hinders the action of the driver in making deliveries and slows up the time of delivery considerably. The suits cost \$14 apiece, including coat and cap. They are cleaned and pressed free of charge to the driver as often as necessary in the clothing department of the Boston store. The cost of obtaining these advantages is very small in comparison with the results achieved. It costs the Boston Store only \$28 a year per truck for uniforms for both the driver and his helper. The advantage of uniformed drivers in raising the level of the delivery service is hard to set down in any dollar and cents value, although its presence is realized. Every housewife prefers to see a clean, natty-looking vehicle drive up to her house when making a delivery in preference to a truck which appears to be falling apart.

Uniforming is one of the best and cheapest methods of keeping the driver clean. Another example of how the driver uniform problem has been solved is the experience of the Otto Stahl Co., New York City, dealer in fresh and cooked meats. That company has found that clean uniforms are required to satisfy its customers. When deliveries were confined to New York City only, that company equipped all of its drivers with white uniforms. These were changed every day, at the expense of the company. However, that proved too expensive, and as a result blue and brown uniforms became more popular. Three of these suits are kept on hand by each of the drivers. These cost from \$3.50 to \$4 each. On the average they are changed every other day, though no set rule demands this schedule.

Helpful Hints for Guarding Against Accidents

To the Editor, COMMERCIAL VEHICLE:  
What ideas have you in regard to the prevention of accidents and careless handling of the trucks? All of our trucks are of the light delivery type and it is necessary that the drivers make speedy deliveries in order to fulfill the day's schedule. As a result, caution is often thrown windward and accidents have occurred which could well have been avoided. Our main difficulty has been in getting the drivers to be more careful in shifting gears, lubricating the springs, etc. We believe that it is possible to materially reduce maintenance costs by creating the driver's interest in all of the points outlined and would like to know just what other fleet owners have done.—READER.

The prevention of accidents has been discussed in THE COMMERCIAL VEHICLE time and again. There are many methods designed to make the truck driver more productive. The driver of a truck is the most expensive single charge and the final cost per commercial ton-mile is influenced to a very large extent by



the manner in which the driver operates his truck. If he is careless and indifferent, the resultant cost may be excessively high, notwithstanding that the truck is one of the best on the market and operated under the best possible conditions of loading and unloading. The problem of the driver, therefore, is one which the fleet owners must study in all of its aspects before he can expect to solve it in a satisfactory manner.

The question of bonus systems as a means for securing more efficient work from the driver should be studied from all angles. It is evident that no one bonus system can be applied to different classes of work. If an owner operates different sizes of trucks in entirely different classes of work, he must divide up the work classifications and determine upon a basis for each class of work. The necessity for a different basis seems patent, since it is obvious that the same basis could not be applied to trucks hauling bulk material such as sand and stone and to light  $\frac{3}{4}$ -ton trucks delivering packages.

On the other hand where only one size of vehicle is operated, conditions for the use of the bonus system are ideal. One good example of this is the experience of the Interborough News Co., New York City. This company tried to combat the accident evil by warning its drivers of the dire results from careless driving. But this proved of no avail, as the suits for damages from injuries to pedestrians and from property damage came in just as frequently as ever. The discharge of those who were frequent offenders did not bring results as the company soon found that its delivery system would be completely demoralized through a dearth of drivers. On May 1, 1919, a bonus system was installed as a means of reducing the number of accidents, violations of traffic regulations, and also as a means of keeping the trucks in good running condition.

Each month a bonus of \$50 is offered those drivers who show the best records. This bonus is split up into three \$10 prizes and four \$5 prizes. To win the bonuses the drivers must drive through the period of 1 month without having accidents, either personal or property damage; must report on time and must see that their gasoline and oil supply is adequate. In addition, they must see that their lamps are in good condition and cleaned and must also keep the trucks free from strings, ropes, wires, etc.

Since the bonus scheme has been in operation, the Interborough News Co. has had few suits resulting from accidents, etc.; its drivers have been showing more judgment as regards speed and traffic regulations, and, in all, their productivity has been greatly increased. The drivers are constantly reminded of the need of careful driving, etc., by a printed notice which is placed in a prominent place on a bulletin board in the garage. The words "Safety First" are prominently displayed.

Another efficacious way of getting results in reducing or avoiding accidents was described on page 350 of the July 1,

1920, issue of THE COMMERCIAL VEHICLE. Two generally accepted methods are shown. The first method is by means of periodical group meetings of the drivers, held, if possible, during the working hours and on the company's time whenever a group of half a dozen or more drivers may be got together and addressed by the delivery superintendent or the man in actual charge of the drivers. The second method is somewhat similar to the first except that it takes the form of a dinner paid for out of the company's funds and held in the evening after working hours.

No matter which method is selected the manner in which the attempt is made to get the message home is of the utmost importance. There is one way in which it cannot be done and yet another way, just as easy and as simple, by which it can be done. The message cannot be driven home to the drivers by the executive if he attempts to threaten their jobs by saying that they will be discharged if found negligent or careless.

On the other hand, the method of driving home the message of careful truck driving to avoid accidents that has produced the most satisfactory results in actual practice is that of appealing to the driver's heart instead of his head. The appeal must be made to his inner self—to his conscience—and this appeal driven home by a mental picture of the probable suffering and possible loss of life which may result from his careless truck operation.

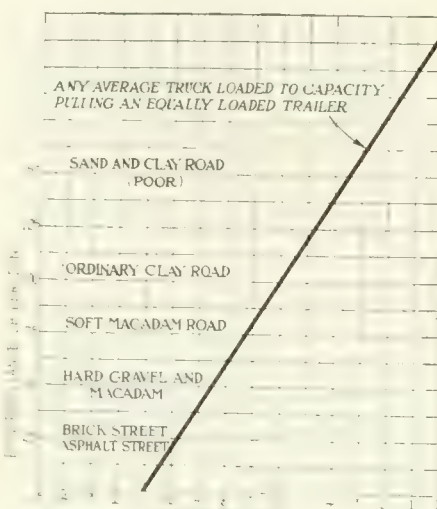


Chart showing the road resistance of rubber-tired trucks and trailers on various types of roads

## Road Resistance of Truck and Trailer

To the Editor, COMMERCIAL VEHICLE:

I would appreciate any information you can give as to the maximum grades that are negotiable on various types of road with an average loaded truck and an equally loaded trailer. I would also appreciate your defining the terms reversible and non-reversible trailers.—READER.

The accompanying chart will give you the information wanted in your first

question. The Troy Wagon Works Co., Troy, Ohio, some time ago published information along this line and we are passing it on to you. According to figures given at that time, the road resistance of rubber tired trucks and trailers on various types of roads was as follows:

Type of Road	Road Resistance in lbs. per ton
Asphalt	20
Smooth brick	25 to 35
Poor brick, ordinary (cobble or macadam)	35 to 60
Hard dry clay road or hard gravel road	50
Soft macadam	75
Ordinary country clay road	100
Ordinary country sand road	150
Sand 3 in. deep	275 to 300

A non-reversible trailer is one that only can be drawn from one end. It cannot be backed up without being uncoupled, and backed by hand power.

A reversible trailer is one that can be drawn and steered from either end, therefore making it possible to back same into any position that a motor truck can be backed. It is possible to pull reversible trailers in trains of two or more if necessary, provided both drawbar ends are identical. It is also possible, when reversible trailers are used, to operate the train in the opposite direction, by uncoupling the truck, turning same around, coupling up to the opposite end of the trailer, and starting in that direction, in least possible time.

## Organized at Last

(Continued from page 373)

for \$1 is a crook, just as the man who says that he can put 2 gallons in a 1 gallon jug is crazy."

The U. S. Motor Truck Co. has a fundamental rule of normal and maximum capacity. They would rather lose a sale than have a dissatisfied customer or a customer who is a detriment to future business. One trouble with manufacturers is that they do not educate the man to whom they sell their trucks. "One man in this room," Mr. Alvin said, "bragged to me that he ran trucks day and night."

## Not Fair to Trucks

"I asked him when he cared for them, and he answered: 'Sometimes on Sunday.'"

"Now, the railroad locomotive goes over only one division of the railroad before it is thoroughly overhauled, but the truck owners abuse their trucks. Therefore, when you attack the manufacturer and roast him, roast yourself. For both the manufacturer and user are at fault.

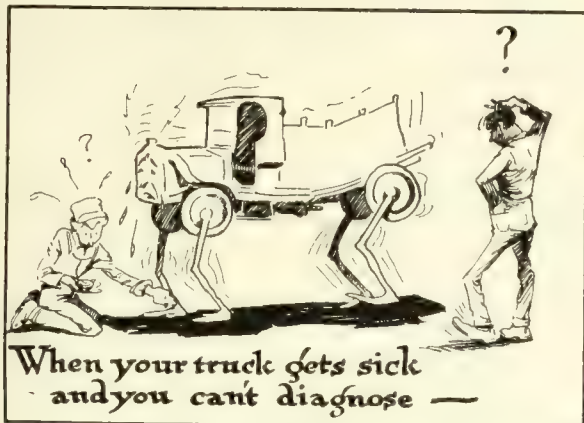
"Remember, too, that the manufacturer cannot always be right in his selection of dealers and salesmen. How, then, can the truck manufacturers always be sure of their salesmen?"

The highways belong to the people, but in order to build good highways we should have Federal control run by business men and not by politicians.

In closing Mr. Alvin stated that the National Association of Commercial Haulers are back of a movement which is going to save this nation.

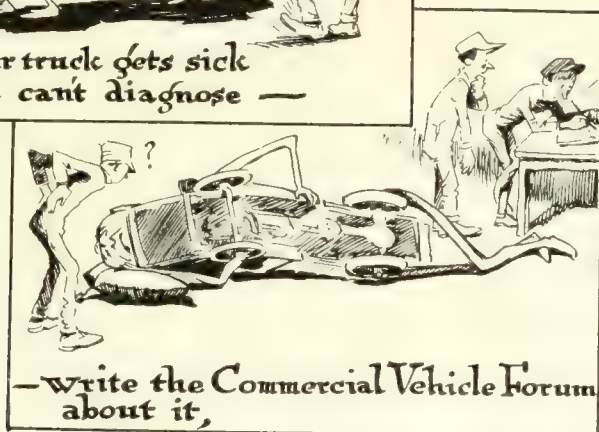


# Let Us Help Solve Your Problems!

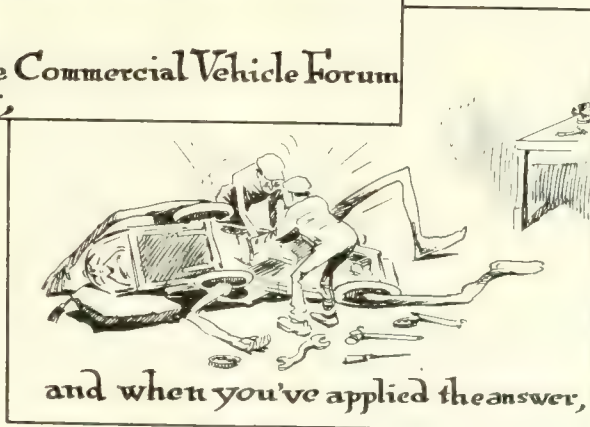


*The FORUM Department*  
of  
**THE**  
**COMMERCIAL VEHICLE**

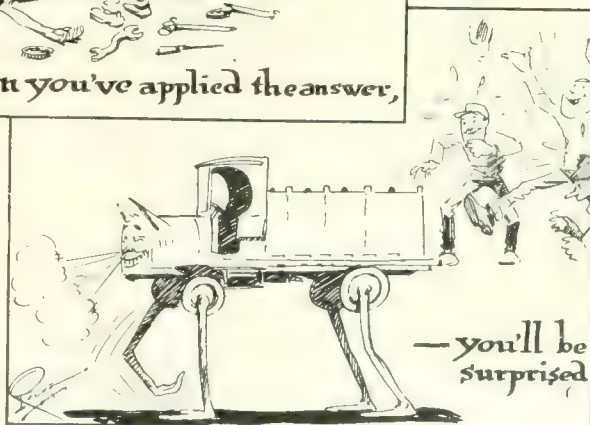
Will Tell You What  
To Do—



*If You Are Puzzled  
by Any Problem  
of Installation,  
Operation or Maintenance,  
Write to the Editor and  
Your Question Will Be  
Answered in the FORUM!*



*Why Not  
Use It?*



**THE COMMERCIAL VEHICLE**

239 WEST 39th STREET

NEW YORK CITY



## Why Not Standardize This Practice?

AS the motor truck developed from an experiment into an accepted practical success, it won its first foothold as a factor in national transportation.

But at that time the foothold was a precarious one and they were courageous and highly progressive business men who ventured to buy a truck instead of sticking to the old tried-and-true method of horse-drawn delivery and haulage.

With the individual buyer, the truck was still more or less of an experiment, and when he bought his truck he followed very much the old familiar practice and dickered for it just as he had always dickered for his horses.

Perhaps this early practice of dickered for trucks may have been the fault of the manufacturer. Perhaps it was the fault of the buyer, who expected to dicker and had his expectations met by the manufacturer. However that may be, trucks were usually sold singly in those days and were usually sold on the old, horse-trade basis.

But as the truck developed and at last grew to be generally recognized as an important factor in our national transportation, it was inevitable that single vehicles should be replaced by fleets, in cases where the amount of transportation justified additional vehicles. And this practice of installing fleets become more and more general as the superiority of the truck over the horse became more and more apparent.

But as haulage by truck grew more extended in scope, and as fleet owners worked out the details of operating and caring for trucks in fleets, it soon became obvious that repair stations, owned and operated by the fleet owners themselves, were not only a saving but a necessity, from the standpoint of saving time and keeping the trucks on the road.

To meet the needs of these fleet owners, truck manufacturers were quick to appreciate the advantage to both buyer and seller of quantity truck sales; to the buyer because purchasing trucks in quantity meant standardization, cheaper parts stocks and less time and trouble in making the purchase, and to the seller because a sale in quantity meant greatly lessened overhead expense in selling that number of trucks, when they were sold to a single purchaser.

In buying trucks in quantity, the purchaser naturally expected a discount. And in selling trucks in quantity, the seller could naturally afford to give a discount. But, unfortunately, few manufacturers drew up any uniform standard of practice in allowing these discounts. Old habits stick, the old way is the easiest, and many manufacturers preferred to stick to the old way of horse-trading their trucks and getting the best price for them and giving the smallest discount on them that was possible.

This is bad. It is bad business, in the first place for the manufacturer, but it is doubly bad for the fleet owner, because he is forced into a position where he can only guess as to whether the concessions (?) made him are as good as those obtained by a competitor who jockeyed a little longer, or as good as he himself could have obtained by a little more "trading."

Why not turn the spotlight of publicity on this whole proposition? Why not force the manufacturer to come out in the open and admit that a discount is allowed on sales in quantity and force him to announce just what that discount is, according to the number of trucks involved?

The fleet owner holds the reins. He can always demand—and get—anything that is fair. Why not demand some guarantee that the discount allowed him is the best discount—the same discount—allowed any other purchaser of the same number of trucks? Why not incorporate such a guarantee in the contract for the trucks?

There is no question in the mind of any manufacturer that the fleet owner is entitled to a discount when he buys in quantity. *There is no question in anyone's mind that the allowing of this discount is a common practice to-day.*

Why not come out in the open with the whole question? Standardization in distribution is as essential as the standardization of measurements.

The fleet owner has plenty of reason to establish this standardization. He has plenty of power to establish this standardization. Why not insist on getting it?

Let us get together, drag the whole question out into the open and settle it once and for all.



## Will Continue Battle Against State Laws

### Indianapolis Truck Operators Are Threatened with Wholesale Arrests

INDIANAPOLIS, IND., July 6.—Wholesale arrests of motor truck operators of Indianapolis is threatened as the result of action determined upon in a conference of motor transport interests to-day, in which it was elected to continue a court battle against the State truck license law. This determination was communicated to Judge Collins, criminal division, municipal court, where a series of eighteen prosecutions has been under way against William S. Frye, of the Indianapolis Transfer and Warehousemen's Assn. These are test cases being defended by the association, which has protested the old and the new license laws. Not more than 10 per cent of the motor trucks operated in Indianapolis in the last 3 years have paid license fees or carried license plates.

To-day's conference included J. J. Bulger, Retail Grocers' Assn.; R. C. Yeoman, Indianapolis Sand & Gravel Assn.; Joseph Hays, Master Plumbers' Assn.; R. K. Graham, Indianapolis Coal Dealers' Assn.; William G. Kiers, Dan Moran, Indianapolis Transfer Assn.; William S. Frye, Indianapolis Transfer & Warehousemen's Assn.; W. A. Strohn, Commercial Warehouse Assn.; W. O. Moore, Indianapolis Wholesale Grocers' Assn.; R. H. Losey, Indianapolis Auto Trade Assn.; L. M. Shaw, Indiana Automotive Trade Assn.

The truck operators were aroused to protest against the license law adopted in the 1919 Legislature and have consistently refused to take out licenses. City ordinances were defeated and others that were passed were fought and overruled in court action. The basis of contention has been that the State license laws levy a tax on the motor trucks for maintenance of State highways and that the truck operators concerned in this litigation do not use the highways. City ordinances were resisted on the basis that they were not uniform and equitable.

In the 1921 Legislature a new license law increased the license fees provided in the former law and repealed the old law. The cases already on file against Frye were based on the old law which has been repealed. It is anticipated that these cases will be dismissed and that Frye will be rearrested on complaints based on the new law.

The commercial haulers have been advised by counsel that if they elected to continue the litigation, in face of an offer of compromise by which the statutes would not be attacked, that the State, county and city authorities would proceed with general and wholesale arrests and prosecutions of the truck owners and operators.

The "Noll" law, effective June 3, requiring a certificate of title for every

motor vehicle operated in the State, has been driving the motor truck operators from cover. The certificate of title cannot be issued, according to the law, except for cars registered and licensed. This was automatically bringing the truck operators to compliance with the license law.

To combat the license law the commercial haulers must also combat the certificate of title law. In the conference to-day, the sand and gravel men, retail grocers, master plumbers, coal dealers, commercial warehousemen and wholesale grocers pledged financial support for continuation of the litigation.

The entire situation will be placed before the trade associations for discussion and review. Representatives of the State and city associations express the unofficial opinion that the proper action is for the truck operators to comply with the law, pay the license fees and prepare for concerted action to enact proper statutes. It is doubtful whether or not the trade associations will endorse the present course.

### California Railroad Commission Opens Truck Dept.

SACRAMENTO, CAL., July 1.—The California State Railroad Commission announces the establishment of a motor vehicle department, due to the great growth of freight and passenger transportation by automotive vehicles in this State. The department will be under the direction of Charles A. Bock, and headquarters will be in the offices of the railroad commission. According to the announcement, the new department will be responsible for all detail work connected with the automobile stage and truck industries in California; will care for all informal as well as official correspondence, complaints and suggestions; will maintain up-to-date timetables and schedules of all automotive services in the State; will handle applications which can be disposed of by expedite orders; handle and assign public hearings, answer all verbal inquiries, and in general assume responsibility to the State Railroad Commission for all work in connection with the operation of motor stages and trucks throughout the State.

### New Road—More Trucking

CHICAGO, July 2.—With the completion of the concrete section of the Dixie Highway from Chicago to the Indiana State line, a distance of 125 miles, motor truck lines are in daily operation and are doing a large volume of business. One of these, incorporated as the Chicago, Kankakee, Watseka & Danville, has opened warehouses at all important places and also appointed local agents. An average rate of 25 cents per 100 lbs. of freight is proving attractive to shippers and the volume of business handled shows a steady increase and is cutting heavily into the earnings of the steam and electric lines in that territory.

## Start Reductions on Truck Prices

### Packard, Clydesdale, Denby and Other Companies Make Initial Step

NEW YORK CITY, July 11.—A number of motor truck companies this month have followed in the footsteps of the passenger car companies by making substantial reductions in prices on their trucks. One company, the maker of the Mack, has decided to give a running guarantee of 90 days against price reductions. Those prices that have been reduced are as follows:

DETROIT, July 5.—The Packard Motor Car Co. has made the following reductions on its trucks: Model EC from \$3,700 to \$3,500; ED from \$4,450 to \$4,100; EF from \$5,550 to \$4,500; and EX from \$4,200 to \$4,000.

DETROIT, July 1.—The American Commercial Car Co. has reduced the prices of its Wolverine trucks as follows: 1-ton \$2,125, formerly \$2,240; 1½-ton \$2,375, formerly \$2,465; 2-ton \$2,640, formerly \$2,750; 2½-ton \$3,425, formerly \$3,475 and 3½-ton \$4,100, formerly \$4,150.

CLYDE, OHIO, July 7.—Prices on Clydesdale trucks have been reduced on the following models: Model 42, 1½-ton, from \$2,750 to \$2,475; model 65, 2½-ton, \$3,540 to \$3,250; model 65E, 2½-ton, \$3,775 to \$3,450; 3½-ton, \$4,400 to \$4,100, and 5-ton, \$5,500 to \$4,500.

DETROIT, July 5.—The new prices on Denby trucks are as follows: Model 31, ¾-1-ton \$1,625; model 33, 1½-ton \$2,300; model 34, 2-ton, from \$2,800, \$2,600; model 25, 3-ton, from \$3,600, \$3,300; model 27, 4-ton, from \$4,600, \$4,200; model 210, 5-ton, from \$5,300 to \$4,850, and model 214, 7-ton, from \$6,200 to \$5,500.

JACKSON, MICH., July 1.—Briscoe Motor Corp. has reduced the price of its 1-ton truck to \$1,160 with panel body and to \$1,085 with the screen body.

SIoux CITY, IOWA, July 11.—The Hawkeye Truck Co. has reduced prices, as follows: 1½-ton, \$1,850, formerly \$2,365; 2-ton truck, \$2,650, formerly \$2,915; and 3½-ton truck, \$3,700, formerly \$4,345.

### Mack Guarantees Prices

NEW YORK CITY, July 5.—The International Motor Truck Corp., manufacturer of Mack trucks, has decided to give a running guaranty of 90 days to both dealers and purchasers against price reductions. No time limit has been set upon the period during which this guaranty will be given but it can be revoked by the company at any time. The guaranty only applies where trade-ins are not part of the sale.

### Service Station in Rockford

ROCKFORD, ILL., July 9.—A service station for International trucks has been opened at 116 North Court Street, this city. In the past, such service has been looked after in Freeport.



## Little Interest in Truck Auction

### Overseas Trucks in Good Condition—Lack of Demand Due to Business Conditions

NEW YORK CITY, July 5.—Lack of interest was the most striking feature of the three-day auction sale here of reconditioned American-made army trucks brought back from England by the Truck Co. of America. There was light bidding because of the small attendance, which did not exceed 50 the last day. Only 90 of the 200 trucks offered were put on sale.

General business conditions in the truck transportation field were blamed for the lack of demand. During normal times there would have been little hesitancy on the part of buyers. One man in attendance stated that while he considered the trucks good purchases, he could not afford to add to his fleet when many of his vehicles were already idle.

Though the vehicles were in good condition and considered bargains, those wishing to buy were reluctant to bid much above \$1,500 for any of the trucks. The sale included 5½-ton Macks, 5-ton Pierce-Arrows, 3½-ton Packards, 3-ton Whites, 4-ton Rikers and 1½-ton Commerce.

Because of the light bidding, the auctioneer was forced many times to reject the bids. The last day \$900 was the highest bid for one of the Packards. While some of the trucks were said to have been sold for around \$2,500, the bidding was carried above the \$1,500 mark by representatives of the company.

In one particular instance, the auctioneer led the prospective buyers to believe that the trucks carried a manufacturer's guarantee. This was not so, the only guarantee being one against defective parts within 30 days of purchase.

It is stated that the Truck Co. of America is planning to auction off reconditioned passenger cars used in Europe during the war. No date has been set for this sale.

### Alena Steam Company to Make Engines Only

INDIANAPOLIS, IND., July 2.—Plans for the manufacture of a steam-propelled truck and tractor have been definitely abandoned by the Alena Steam Products Co., which will devote itself entirely to the production of power units. The Hamilton engine, designed by Fred Hamilton, president and chief engineer of the company, is said to have less than fifty moving parts. It is a double cylinder type, with 4½ by 5½ in. cylinders, radial valve gear and piston valves, and develops up to 110 hp. One feature is that the engine takes care of condensation without the use of cylinder drain cocks. Exhaust steam is carried directly from the cylinders to a tubular condenser mounted in the position of the conventional radiator. Gravity carries

the condensed water back to the tank. Pumps supply the boiler.

A feature of the boiler construction is claimed to be that it is impossible to burn the crown sheet. A "mud-ring" at the base of the boiler provides a "self-cleaning" feature, and it is said that a clean crown sheet cannot be burned. In addition, the boiler is said to be designed so as to entirely eliminate pitting of flues and to do away with the need for frequent cleaning of flues.

An enlarged type of Bunsen burner, using kerosene, is used. A super-heating device permits of carrying the steam to a temperature of 650 deg. An experimental 5-ton truck has been getting five miles to the gallon of kerosene and 75 miles on 50 gallons of water, according to the officials of the company.

When installed in a truck, the engine crankshaft is connected directly to the differential, and the whole assembly from the rear resembles the conventional rear system of a gasoline truck. The boiler is carried under the hood, which is of the conventional style. The water level in the boiler is controlled and maintained automatically, as is the fire.

The company was organized in February, 1920, and is capitalized at \$1,000,000. It will build two types of power plant, a horizontal one for trucks and a vertical one for tractors. The officers are Fred Hamilton, president and chief engineer; John W. Cadle, secretary and treasurer; George W. Kilman, vice-president; C. E. Gordon, general sales manager; R. B. Hall, plant superintendent.

### To Test Electrics for Mail Handling in New York

NEW YORK CITY, July 13.—The Post Office Department recently authorized the expenditure of \$50,000 to conduct an investigation which shall tell whether or not the electric truck is suitable for use of the post office in transporting the mails. The investigation will cover the present method of handling mail in New York City and will pay particular attention to the relation between costs and results that has attended the use of gasoline trucks.

### New Trucking Concern

INDIANAPOLIS, IND., July 1.—Announcement was made to-day of the completion of the organization of the White Star Line Transfer, Inc., of this city. The company will do a general transfer business and has a capital stock of \$25,000. The men interested in the company are T. R. O'Donnell, W. C. Johnson and W. S. Kerch.

### Coming Events

1921

September, 1921—Sacramento, Cal. Seventy annual truck show during State Fair, State Agricultural Society, Sacramento.  
Sept. 28-30, New York City, Electrical Show, 71st Regiment Armory.  
Sept. 2 weeks, Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.  
October 12-14, Chicago, Ill., Annual Convention of the National Implement and Vehicle Assn. H. J. Samiet, Sec'y., 72 West Adams St.

## Trolley Company May Run Own Buses

### Connecticut Co. Plans to Meet Competition with 10 Cent Fares and Transfers

NEW LONDON, CONN., July 2.—Verification by President L. S. Storrs at a hearing before the Public Utilities Commission in Waterbury of long-standing rumors that the Connecticut Co., which has a near monopoly of trolley franchises within the State, plans to meet motor bus competition through the operation of motor buses with 10 cent fares and transfer privileges, is causing considerable concern to automotive interests throughout the State.

Such jitney service, it was stated by President Storrs, would be on streets and in territory which have no trolley service or where service is in danger of abandonment because of non-payment of operating expenses. Should such service be inaugurated in Waterbury and vicinity and prove a success, automotive interests believe it will be extended to State-wide adoption. That it will cripple or seriously curtail privately-owned motor bus competition is the belief of automotive interests, and, by so doing, hit them a serious financial blow.

### Weight Limited to 20,000 Lbs.

BAKERSFIELD, Cal., July 2.—Gross weight of motor trucks and loads on the roads of the San Joaquin Valley counties will not be allowed to exceed 20,000 lbs., if the resolution adopted by a meeting of supervisors representing all these counties, held here recently, is approved by the counties. This resolution places the maximum gross weight of trucks and loads at 20,000 lbs., but the supervisors were far from unanimous in their action, many believing the maximum should be a ton more, or 22,000 lbs. Delegates from Kings and Tulare counties, where weight restrictions now are very drastic, outvoted the more reasonable delegates from Fresno, Kern and Merced counties, however, and the 20,000 lb. ordinance was passed.

Fresno County now has an ordinance placing the maximum gross weight at 18,000 lbs., but this has been found impractical of enforcement, because it prevents operation of 5-ton trucks. Fresno County owns and operates a number of trucks of that size, and the supervisors, naturally, are not very keen to rule their own equipment off the roads. A similar situation exists in some of the districts of Kern County. It was pointed out to the supervisors by a representative of the Mack truck that a 20,000-lb. restriction would encourage overloading to smaller units, while barring the 5-ton truck. Some of the supervisors declared it would be more damaging to the roads to overload a 3½-ton or a 4-ton truck than it would be to permit a 5-ton truck to carry its capacity load, because of the larger weight-bearing tire surface.



































THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President      E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. C. Building  
239 West 39th Street, New York

CONTENTS

Vol. XXV, No. 1      August 1, 1921

LEADING ARTICLES

Is Your Routing Right?.....	7
Your Driver or—Your Partner?.....	10

MISCELLANEOUS ARTICLES

Trucks in Many Industries.....	12
Where They Load—And How.....	13
How to Get Better Engine Operation by Balancing of Parts.....	14
The Trucks That Had Imagination..	17
The Cost of Keeping It Moving!.....	18

DEPARTMENTS

The Better Way.....	20
Buyer's Department:	
Walter Now Building Electrics as Well as Gasoline Trucks.....	24
Ajax 1½-Ton Truck Is Worm-Driven .....	25
Truck Accessories.....	26
Shop Equipment for Fleet Owners.....	28
Demountable Bodies Save Money.....	30
Motor Truck Electric System Wiring Diagrams	31
The Fleet Owners' Forum.....	32
Editorial: What Is Idle Time?.....	36

NEWS

Big Increase in Bus and Freight Lines.....	37
Serious Situation in Illinois.....	37
Ramps in Six-Story Oakland Building.....	38
L. C. L. Freight Hauled by Tractor-Trailer.....	38

Index to Advertisers.....82-83

The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT  
David Beecroft, Directing Editor  
Ray W. Sherman, Executive Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as  
second-class matter, September 13, 1906, at the Post Office,  
New York, New York, under Act of Congress, March 3, 1879

BRANCH OFFICES

Chicago, Mollers Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devon-  
shire Street.

SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law .....	.50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

ADVERTISEMENTS

Changes in copy for advertisements must be in the office of pub-  
lication not later than 10 days before date of publication.  
Owned and copyrighted, 1918, by United Publishers Corporation.  
Address 243 West 39th St., New York. H. M. Swetland, Presi-  
dent; Charles S. Phillips, Vice-President; A. C. Pearson,  
Treasurer; Fritz J. Frank, Secretary.

WYMAN-GORDON  
The CRANKSHAFT MAKERS  
WORCESTER, MASS.      CHICAGO, ILL.      CLEVELAND, OHIO

ESSENTIALS

MOTOR PERFORMANCE heads the list of essentials a manufacturer must consider and the CRANK-SHAFT makes or mars the operation of any motor.

THE SELECTION OF A WYMAN-GORDON CRANK-SHAFT not only guarantees the best results but is *prima facie* evidence that the manufacturer is satisfied with nothing but the best.

OUR ENGINEERING DEPARTMENT is at your service in connection with any problems of crankshaft design.

OUR TWO LARGE PLANTS protect your deliveries as scheduled.

OUR THIRTY-EIGHT YEARS EXPERIENCE in the forging industry guarantees the quality of our product.

FORGE SHOPS AT  
WORCESTER, MASS.      HARVEY, ILL.

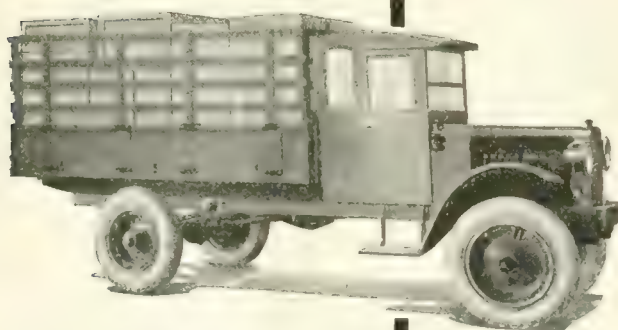




TRIANGLE "Highway Express." Model AA.  $\frac{3}{4}$ -1 ton.



TRIANGLE "Utility Model."  $1\frac{1}{2}$ -ton. Model A.



TRIANGLE "Semi-Heavy Duty." 2-ton Special. Model C.



TRIANGLE "Heavy Duty."  $2\frac{1}{2}$ -ton. Model B.

TRIANGLE  
MOTOR TRUCKS  
ST. JOHNS MICH. U.S.A.  
"At The Peak of Performance"  
POWER SERVICE  
DEPENDABILITY

## Your Opportunity— At Factory Prices

**W**E feel that you owe it to yourself to investigate fully all the details of our new Factory-to-Fleet Owner Selling Plan. This plan places a REAL truck in your hands at the initial price advantage to which you, a Fleet Owner, are entitled.

It may easily represent the most important buying opportunity you have ever had.

From the very first, TRIANGLE Trucks were "right." They were correctly designed, with an abundance of reserve power and capacity. Their peculiar toughness and suppleness of performance have made them unusually long lived, and easy to maintain.

They are built all of nationally known parts. Waukesha high torque motors, Clark internal gear driven axles, Fuller clutch and transmissions, Eisemann high tension magnetos, Gemmer steering gears, SKF self-aligning ball bearings, and Perfex non-freezing radiators, all guarantee "The Very Peak of Performance." In addition there are structural features of our own, such as the *amidships service brake*, and *special short turning radius*, in themselves valuable features of efficient control.

So well have these units been harmonized, in fact, that TRIANGLE Trucks, in the hands of scores of enthusiastic users are consistently outdoing other makes by actual performance-sheet tests.

We invite your candid investigation. You are an intelligent buyer. You have your organization, your work and your problems. The TRIANGLE will help you solve them—at a really worth-while saving every way.

Would you like the reasons? Address Department Y,

and we will be glad to hear from you.

### TRIANGLE MOTOR TRUCK CO.

Home Office and Factory:

St. Johns, Michigan, U. S. A.

... TRIANGLE ... filled, in every way, all the Distributor and Salesman promised. We consider this ...

LORD & SONS, Stamford, Conn.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Vol. XXV August 1, 1921 No. 1

## IS YOUR ROUTING RIGHT?

*Do You Direct the Course of the Truck from  
the Garage Door Back to the Garage Door  
Again?—Economical Routing Is a Science!*

A DEFINITELY planned system of routing is indispensable to efficient motor truck operation in almost all cases.

This factor in operation looms larger in some classes of haulage than in others.

In department store work it is probably the most important of all delivery problems. In all classes of haulage where the trucks make several stops it looms up as a big factor.

In contracting work it has its importance. It is a highly necessary factor in the efficient operation of trucks making city runs of all kinds, even those to freight yards, involving only one stop. It is one of the most important features of operating a bus line. And even in inter-city haulage the choice of roads to be followed will have an important influence on making the run an economical or an extravagant one.

By Albert K. Weinberg

For routing means far more than simply delegating which truck shall make a certain delivery. It means how and when that truck shall get to that delivery point and how and when it shall proceed to the next delivery point or return to the point of departure.

### Careful Attention Required

Routing is a problem which should receive as careful attention as the more obvious one of mechanical upkeep and repair. Because good routing means getting a truck to a given point in the shortest possible time, with the lowest possible mileage and hence at the lowest possible cost. Good routing should be a standard practice and an ever present maxim with every operator, shipper and superintendent. For upon it depends the profits made by, or the economical operation of, the truck.

As department store delivery work in-

volves the most careful routing, consider that.

If trucks are sent out simply as customers turn in their orders and the load is assembled, the result is a high delivery cost. Not only may stops be far apart, but two trucks may be sent to the same general locality. Outlying deliveries may be made which do not justify the operating costs and might better be turned over to an express company or other common carrier. Trucks may be proceeding to their destination by an improper and uneconomical route. Only a few deliveries may be made where a much larger number was possible. The type of truck in use may not be the most economical type available. For example, where a large number of stops are involved an expensive type of truck may well be replaced by an inexpensive type. And this is giving only a few examples. The list could be almost indefinitely extended.

### Zone Maps Essential

The backbone of all routing schedules, so far as multiple delivery haulage is concerned, is the division of the delivery area into zones.

The division into zones may involve only a few square miles adjacent to the point of departure, that is, the loading point, or it may include the entire city as

# Right Routing Saves Money!

well as outlying districts. The latter is usually the case, where department stores are concerned.

Practically, the division of the area into zones involves primarily securing a suitable map. The more comprehensive the map, the better. It should be on as large a scale as possible—large enough so that it will be possible to designate clearly on it the location of all freight receiving and distributing stations, express stations, factories and local warehouses whence supplies are drawn and, finally, the street boundaries of the various delivery routes.

It should also show all streets, roads, bridges, toll-gates, docks and ferries, so that the laying out of the routes may be as intelligently and practically adapted to actual conditions as possible.

## Routing on the Map First

The map should be hung up or pasted on the wall in a convenient spot where it can be readily seen, affording opportunity for constant study. The map should be divided into zones and each one of these zones assigned to one truck, or, in the peak load period, to two trucks.

Then, before the trucks are sent out to make their deliveries, it should be the duty of one member of the shipping staff to plan each route according to the deliveries to be made, indicating the stops temporarily on the map. One method for indicating the stops and deliveries is to press colored thumb tacks into the map at the points of deliveries. Each truck will have a different colored tack and as possibilities of advantageous changes become apparent, either the

routes themselves can be altered, or deliveries in a certain locality can be assigned to another truck simply by replacing one or more of the tacks with others of a different color.

## Primary Careful Analysis

It should be realized, however, that the routing map is a development and not a beginning—a result rather than a cause. For the determination of the different routes and areas can only be made after much study and a very careful analysis.

The real difficulty of routing is in the analysis on which the map is based. And even after it has been made up, actual experience and performance must serve as a constant check on it, and it should be changed from time to time experimentally.

But the preparation of the map which will best meet the actual possibilities of economy and scientific arrangement will be based on what are called time studies. Whereas the map shows only the scale of distances, the actual location of express stations, freight stations, etc., and the general location of customers, the time studies deal, not with location, but with time.

## Time Elements

The principal time elements, so far as routing is concerned, are loading time, time spent waiting in line, etc., and time taken during stops. But other time elements should also be considered. Some of these are such factors as time spent in traveling at full speed, time at half

speed, time at slow speed and time consumed by other delays connected with the local condition of the route covered.

Modifying the map, which gives actual distance only, by an analysis of each delivery from the standpoint of its actual time constituents, will put the entire routing system on a scientific and economical basis.

For example, suppose the actual distance to two different points is exactly the same on the map. The run to one of these points may be over good roads through a comparatively uncongested residence district, while the run to the other may be partly through a congested business district and partly over bridges, ferries and bad roads. Thus the analysis may show that one delivery is justified while the other should be handed over to an express company or other carrier.

## What Analysis Also Shows

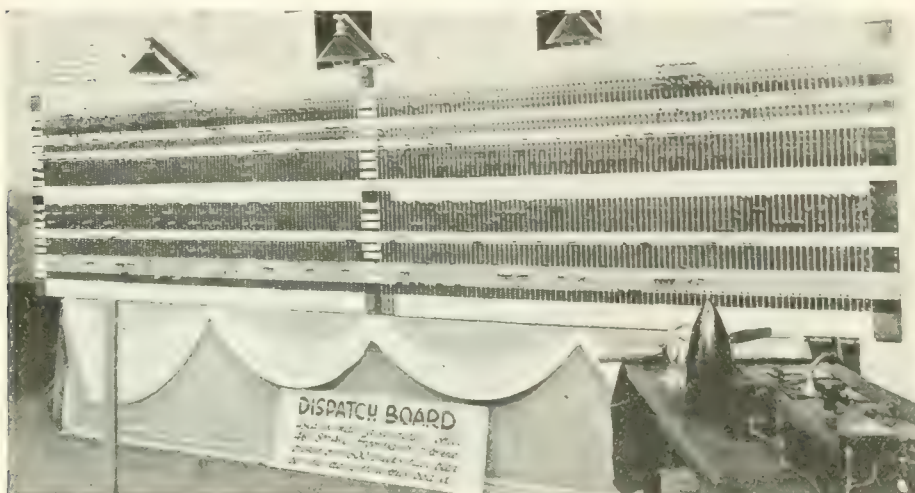
The information gained from the time studies will have other results also. It may easily show that some other equipment is needed. It may show that in one instance a horse and wagon would be more economical than a truck—that in another instance an electric truck would be more economical than a gasoline delivery vehicle—that too much time is spent in loading and a demountable body would relieve the situation—that a helper is needed on one truck—that another truck should make two trips a day instead of one, etc.

The possibility of discoveries which will make for more economical operation from such an analysis are almost endless. And it is obvious from the above that it is only after a careful and detailed analysis of the time element that the shipping clerk, superintendent or operator can plan his routes intelligently, scientifically and economically.

## Applies to All Trucking

Although the route diagram of every fleet owner must vary with the individual conditions under which his trucks operate, it is, nevertheless, possible to consider certain factors of almost universal application. For example, does the operator, whoever he may be, take good care that his trucks are routed so as to as nearly as possible avoid the congested sections of the city? Many times it will pay better to take a round-about route rather than a direct path which lies through a congested part of the city—the round-about route being accomplished in much quicker time.

In determining the streets which are congested, it is much better to rely on actual statistics rather than on impressions of the eye. At the city hall in most larger cities it is possible to obtain



*Reference board, divided into zones, by means of which the United States Army Transport Corps kept a record on 600 trucks. By means of the pegs shown, it was possible to tell at any given time the exact location of any truck in the fleet. Note that the board is divided both vertically and horizontally. A similar device on a simpler and smaller scale might well prove of service to the shipping clerk*



the traffic statistics at certain points which are important in the commercial life of the city.

Road conditions is another point which must be constantly borne in mind. Nothing makes such an inroad into a truck's general and delivery efficiency as a bad stretch of road or street, poorly paved or torn up, over which it has to pass frequently in making deliveries.

In this connection, it is a wise plan to have some form of chart, where the drivers can see it, on which is designated, perhaps by an arrangement of colors, the streets to be used and those to be avoided. A record of streets in bad condition, like traffic statistics, is usually to be obtained at the city hall.

### Saving Time at Terminals

Then there is the question of trucks running to terminals, express offices, ferries and warehouses. Does a fleet owner or his shipping clerk always consider the possibilities for economy in making the schedule of the trucks tally to a fine point with that of the ferry or the train, to prevent waiting? Or he can save much time by dispatching his trucks at slack periods at the terminal or warehouse, which will save money by avoiding expensive line-ups.

A truck standing idle in a line-up is losing money, as everybody knows, but not everybody realizes that a good deal of the time so lost can be avoided by careful routing. In planning the schedule of his trucks, the fleet owner should take care that this loss is avoided, by a careful analysis of the traffic conditions at the ferry, train terminal, etc.

Another important point in the truck's relation to the boat or train is in connection with delivery zones. The more that delivery zones can be arranged in proximity to spur tracks or docks, the more economically will the trucks function.

Trucks should call for freight at terminals closest to the point of delivery. The railroad is, by this method, made to perform a substantial part of the local delivery.

### Routing and Sub-Stations

Routing in connection with the sub-station plan of delivery, employed usually by department stores, involves a distinct problem. The route of a sub-station delivery involves one long haul—which may be up to 10 miles or more from the main store—and many short hauls.

The sub-station plan is one of great inherent advantage from the standpoint of motor truck economy, but only if it is combined with proper routing. The principal thing to remember is that the large and expensive truck is only to be used on the long and uninterrupted haul. This is the haul from the central store to the sub-station.

The local deliveries from the sub-station to the customers should always be performed by light, speedy and inexpensive trucks. The time lost in making many stops is not very expensive with

the lighter truck—but it is very expensive with a large truck.

In all routing, it is important to manage properly deliveries to what are known as border points. When an area has been divided into zones, in accordance with the basic principal of scientific routing, there are many delivery points which will lie on the outer territory of one of the zones. In all such cases, it should be considered from which zone a border delivery had better be made.



Map showing the location of the Loose-Wiles Biscuit Co. plant in Long Island City, New York. The smaller squares indicate the location of the five agencies or sub-stations at which trucks are maintained to serve the outlying points. The concentric circles are 5 miles apart and are drawn with the plant as a center, to give an idea of the territory covered by the trucks.

That is to say, even though a delivery point may lie in the zone of truck 1, truck 2 in the adjoining zone may, on a certain trip, be in a much better position to call there. For example, suppose the point lies in the extreme left of zone 1, while truck 1 runs that day only to the extreme right of zone 1, whereas truck 2 may be operating on the extreme right of zone 2, very close to the border point at which the delivery is to be made.

### Zone Boundaries

The boundaries of the zones themselves can only be determined with reference to special conditions existing in the section in question. For example, zones will be smaller in square miles, where deliveries are more numerous to the square mile.

On the basis of the zone map, the trip of each truck may well be written out by the shipping clerk each day. And the truck driver should be made to follow these instructions.

The detailed routing of the trucks in this way makes it possible for the shipping room to know at just what point approximately the truck is located at any time of the day. Thus it is always possible to get in touch with the driver by telephone should occasion arise.

There are many times when the shipping room wants to give additional instructions or to change instructions already given, after the truck has started on its route. Mapping out a definite route for the driver and making him stick to it, besides being economical, is the only way to make this possible.

It is also possible, through this method, to analyze more understandingly the performance of the truck at the end of each day, week, month or year.

### Devices for Lighting Approved by Massachusetts

BOSTON, July 18—The Motor Vehicle Registrar, F. A. Goodwin, of Massachusetts, has announced his first list of devices which are suitable for lighting purposes on trucks in this State. Others will be added from time to time. He has given truck owners until Aug. 15 to become familiar with the new law.

Name of Device	Focal Adjustment	Aim of Beam
Bausch & Lomb.....	1...1.3" down at 25'	
Brown Reflecto.....	Special Lamp front vertical	
(Adjust for narrowest vertical spread)		
Conaphore Type F		
(colorless glass).....	1...6" down at 25'	
Holophane No Tilt.....	1...Horizontal	
Lee Knight.....	1...4 1/2" down at 25'	
Legalite M 111.....	1...Horizontal	
Liberty Type D.....	1...Horizontal	
Macbeth Type D.....	1...Horizontal	
Patterson.....	1...Horizontal	
Universal.....	1...6" down at 25'	
Wells-St. Clair.....	1 Lamp front vertical	
	Mirror beam 6" down at 25'	
Alpheco.....	1...Horizontal	
Bi-Optic.....	1...6" down at 25'	
Holophane.....	1...Horizontal	
Liberty.....	1...3" up at 25'	
National.....	1...6" down at 25'	
Primolite Type B.....	1...Horizontal	
Syndicate Type A.....	1...Horizontal	
Violet Ray.....	1...6" down at 25'	
Saferlite.....	2...6" down at 25'	
Shaler Roadlighter.....	*2...Horizontal	
Fractolite.....	Special...Horizontal	

\*See manufacturer's instructions.

# Your Driver or—Your Partner?

## No Labor Trouble with This System

**Driver Earns Good Wage, Brings in Business  
and Buys His Own Truck After 12-18 Months**

**T**HERE have been many schemes to insure against labor unrest among truck drivers. But the profit sharing plan conceived by George L. Nadel, President of the United Cartage & Transfer Co., Detroit, appears to have more nearly solved this problem than any other system yet evolved.

Under Nadel's system, the thrifty driver may make a good wage and at the same time become the actual owner of his truck, after a period of months ranging from 12 to 18.

The plan, which was inaugurated January 1, was conceived by Nadel some 2 years ago. But at that time it seemed too daring, and until a campaign to acquaint the drivers with the scheme had been conducted, no attempt was made to put it into execution.

To-day, 25 drivers are operating under the percentage plan, while 17 are still working under the old wage scale. More than half of the 25 who work on percentage are now owners of their trucks. The others are buying them and will own them within a year.

### Work Determines Percentage

When a driver comes to the company, his record is fully investigated, no matter under which scale he works. He can work for wages—if he owns his own truck already, he can work on a percentage basis—or he can buy his truck on the percentage plan.

There is no hard and fast rule as to the amount of percentage exacted. This is determined by the work on hand. There is a 10 per cent allowance on all contracts for the driver's overhead. But the driver who operates under the percentage plan may secure his own contract and if he so elects he may retain all of the money from that contract, but then he must take care of his own book-keeping and collections and settle all disputes himself.

If the driver prefers to have the company handle this end, he is relieved of all responsibility for the 10 per cent. In cases where a job calls for a helper, or, as in Government work, a checker or inspector, that cost is added into the percentage deducted by the company.

Few drivers avail themselves of the opportunity for handling their own ac-

counts. A big factor, of course, is the delay in payment on contracts, and few drivers care to handle them personally and wait perhaps 30 days, perhaps longer, before they receive payment. But with the company handling the contract, the driver can avail himself at all times of a drawing account up to any amount that is due on the contract. This ap-



*This is George L. Nadel, president of the United Cartage & Transfer Co., Detroit, who conceived and put into operation the driver-owner plan described in these pages*

plies to contracts that are secured by the driver himself, as well as those which come to him through the company office.

### Purchase Payment Plan

As to the purchase plan, an original cash payment of 20 per cent is required. The balance is paid in monthly installments distributed over a period depending upon the price of the truck. In cases of drivers who have been with the company for some time, whose personal characteristics and habits are known to the company officials and are of a nature satisfactory to them, a special arrangement

is made and the officials will meet these men more than half way in the effort to put them on the road to becoming truck owners.

It is partly due to this attitude on the part of the company that the latter has been enabled to build up the loyal and closely knit organization of employees which it now enjoys. And in the operation of its business, the company can be said to have reached a point where its labor situation is as nearly perfect as possible.

By this scheme, too, a 100 per cent productive effort is assured to the company from its drivers, not only those who are operating under the percentage or ownership plan, but the wage drivers as well, because the latter have the ownership plan in mind at all times and most of them are simply working on the wage basis until they can accumulate an amount sufficient to enable them to make the first payment on their own truck.

### How the Business Grew

A result of the success of the plan is demonstrated in the constantly growing business of the company. And only quite recently it was compelled to seek larger garage and service quarters and took over the plant of the old Detroit Transfer Co.

The attitude of loyalty and co-operation on the part of the employees is frequently demonstrated in a manner calculated to appeal particularly to the company's clientele as well as the public generally. A notable instance of this occurred recently when the Foundation Co., which was wrecking the old Ponchartrain Hotel to build a new skyscraper, found itself without a certain material.

The amount needed was small but the necessity was vital, and the company exhausted every effort to locate it, but without success. It so happened that one of the United Cartage employees hauling for the Foundation Co. had been in the building trade and knew where this material could be purchased. His acquaintance with the particular company which held the material enabled him to purchase it for the Foundation Co.

This one service assured to the United Cartage Co. the future hauling contracts which the Foundation Co. may have in that vicinity. There are many similar





Two trucks belonging to the United Cartage & Transfer Co.'s fleet. The truck on the left has been purchased and is owned by the MacDonald Bros. as can be seen in the inscription on the side of the cab. But the truck belongs to the United Cartage Company's fleet. The truck to the right is a new one which has not yet been purchased by its driver. Note the excellent appearance of both vehicles

instances of co-operation where the United Cartage Co., through the efforts of its employees, has won and cemented a strong business friendship.

How Maintenance Is Handled

Every truck operated by, or under the control of, the Cartage company carries the company's name, together with the number of the driver operating the truck. As regards maintenance, the condition of the company's trucks is a factor in support of the success of its plan. Every mechanical detail is carefully and constantly looked after and the trucks are kept as clean as possible and in good running condition at all times. The driver operating under the percentage plan, of course, pays for his oil,

gas, new parts and so forth, and he knows that a careless, indifferent attitude on his part to the condition of his truck means so much money out of his pocket in the depreciation of his vehicle and in repairs.

Accident insurance is carried on all trucks and percentage drivers, like the others, are protected in case of accident.

The drivers know that wornout parts mean costly replacement and they are careful at all times to see that every effort is made to lengthen the life of all parts. The desire for ownership, the possibility of which looms always before the wage driver, makes him equally careful despite the fact that wornout parts will cost him nothing personally as yet.

A careful check of the time spent by drivers, the gas and oil used and the replacement expense is kept by the company. And it demonstrates that the wage driver is just as careful as the man who is practically spending his own money when he neglects his truck.

that of the company itself, in all cases.

Should a driver default in his payments for his trucks, the company, of course, holds the mortgage on it and can foreclose at any time.

The company reserves the right to discharge a man from its employ whose connection for any reason appears detrimental. In such a case an equitable adjustment is made of the money already paid on the truck up to the time of discharge, taking depreciation into account. To the credit of the system, it may be said, however, that such a foreclosure has never yet been invoked in the case of any driver.

It will at once be apparent that there are many advantages in such a system to the company, as well as to the drivers. In the first place the owner has very little trouble in operating his trucks because not only do the drivers go out and get business but those working on a percentage basis know that it is to their interest to operate their trucks as efficiently as possible.

Productive Efforts Stimulated

The company takes pains at all times to see that each driver gives all that is in him in his productive effort and looks to the interest of the patron as well as

Advantages to the Company

The distribution of the work and the problem of keeping all the trucks occupied is also considerably simplified under this system. For many of the drivers find their own work, leaving it only necessary for the company to find contracts for the other.

Simply expressed, the system, so far as the percentage basis drivers are concerned, is that the company takes care of the overhead and the driver pays 10 per cent to the company for handling this overhead and for collections and so forth. In this way the company simply acts as an agent.

Moreover, the company acts as a dealer and makes a small profit on each truck by obtaining the trucks at the wholesale price and selling them to the drivers at the retail price.

Again, if times are slack the owner is not carrying a heavy overhead in interest and depreciation.

(Continued on page 34)

DAILY TRIP SHEET  
UNITED CARTAGE AND TRANSFER CO.  
DETROIT, MICH.  
RUMBLE  
OFFICE NO. 1003  
DRIVER NO. 1003  
DATE  
TRUCK  
DRIVER

CAR NO.	LOADING POINT	FROM	ARTICLES	WEIGHT	DATE	TIME	REMARKS
1001							
1002							
1003							
1004							
1005							
1006							
1007							
1008							
1009							
1010							
1011							
1012							
1013							
1014							
1015							
1016							
1017							
1018							
1019							
1020							

FUEL OIL GREASE  
WEATHER  
IF ANY DELAYS STATE WHERE WHEN AND WHY  
GENERAL REMARKS  
Driver

61 GRISWOLD ST  
UNITED CARTAGE & TRANSFER CO., Hauling Contractors  
PRO No. Car No. DETROIT, MICH. 19  
CONSIGNEE  
RECEIVED OF  
From ARTICLES AND MAKE WEIGHT Date W. B. No.  
Back Charges  
Total  
Cartage  
Driver

Two of the forms by means of which the United Cartage & Transfer Co. keeps track of the truck performance and the work accomplished. The form to the left is the daily trip sheet from which the office records the trips per day, time in and out, goods carried, etc. The second form is signed by the driver and handed to the consignee as a record of work done for him

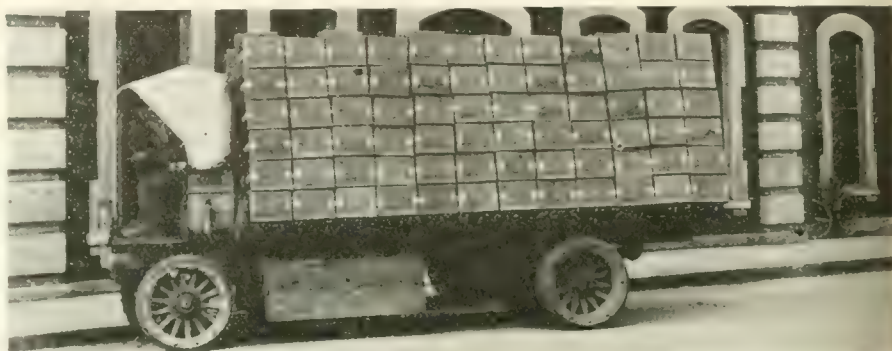
# Trucks in Many Industries



Left—Medium sized trucks are the secret of success in long distance haulage, according to E. C. Stowell, president of the Arrow Line, which operates four trucks daily except Sunday, between Chicago and Milwaukee, and has built up a steady business. Other concerns tried the heavier trucks only to find that they foundered on muddy roads or in deep snow. Indeed, 5 to 7-ton trucks were found far less practical than the 3 to 3½-ton size. But if a bill awaiting the signature of the governor of Wisconsin becomes law, even the 3½-tonners will be barred from the roads in inter-city haulage. The Arrow Line is an incorporated company and maintains offices or depots at intermediate points along the line



Left—A new signal device for the night traffic policemen of New York City. It is operated by tiny electric switches and consists of three lights, red, white and green



Above—Something of a load! One of the big electrics belonging to the American Tobacco Co.'s fleet. It is loaded with boxes of Bull Durham ready for a run to the freight shipping point. These boxes form a very bulky load, although, in comparison to the bulk, not a heavy one. To accommodate the bulk and obviate the necessity for cordage, the body has wide flare boards on the sides, not unlike those on the old-fashioned hay wagon, which tip the boxes slightly inward



Left—"Trust highly fragile and valuable furniture to one of those noisy, bumpy trucks? Not much!" That used to be the attitude of the average shipper. But that's all changed now. This is a 5-ton White truck engaged in hauling a \$40,000 load of antiques, furniture and tapestries, for a new hotel, over a 400-mile run!

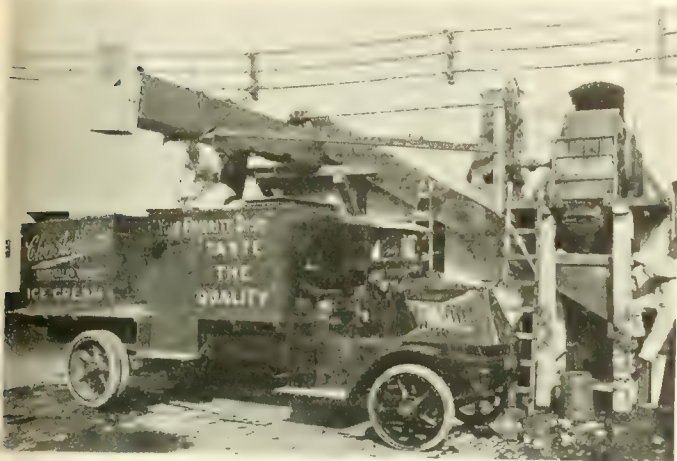


Below—Many trucks and one team at the Texas Co. This is an early morning scene at the big Long Island City terminal of that company. The trucks and the team are loading for the early morning delivery to nearby points and to substations. Unfortunately, no photograph could give an adequate idea of the size of this terminal and the convenient way in which it is laid out. These barrels are loaded by gravity and hand. Somehow, the two horses look dejected in this picture. Evidently they know that they are sadly in the minority these days!

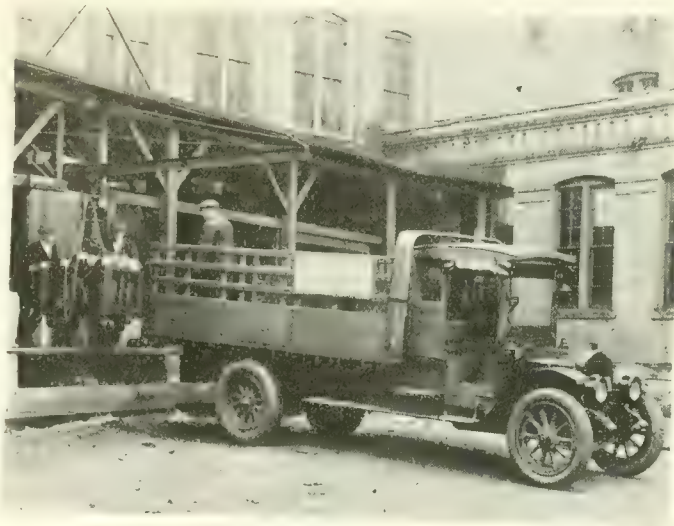


# Where They Load—and How

*Right—Loading boxes of the summer drink, "Moxie," in a congested down-town district in New York City. Anyone who has been accustomed to passing through the side streets where trucks are being loaded, has experienced the inconvenience of trying to pass along the sidewalk or of walking out and around the loading truck. But with this loading system, using gravity conveyors raised high above the sidewalks, pedestrians can walk under the conveyor without inconvenience and without even bending their heads. Note the second conveyor on the left and the man under it*



*Above—One of the big Mack trucks of the Christopher Ice Cream Co., Los Angeles, Cal., loading up with ice. To expedite loading with crushed ice, the company recently installed an ice cracking machine which is connected with the conveyor shown here. Twenty cakes of ice are required to fill the bin. The advertising value of the truck is recognized and all are painted a brilliant red, with the body an orange yellow*



*Right—How the American Pin Company loads its big White trucks with the fine, but exceedingly heavy, wire used in the manufacture of its product. The hand trucks in which the wire is loaded are not unloaded onto the trucks, but are transported as they are and unloaded as required, at the end of the run*



*Above—Another loading scene at a branch of the Texas Company in another part of the United States. Here trucks and teams are shown loading for the early morning deliveries at the St. Louis branch of the Texas Company. Note that the heavy stake trucks, designed for hauling barrels of oil are loaded at the loading platform to the left, by hand, while the oil tankers, both motor trucks and wagons, are loaded under cover by means of conveniently located pipe lines. The tankers pull in one side and out the other, so that there is very little delay*



## How to Get

# Better Engine Operation By Balancing of Parts

**Smooth Running of Engine Brought About by Equalizing Piston Weights, Balancing Crankshaft and Other Rotating Parts.**

THE problem of securing smooth running and perfect balance in an engine lies first of all in the correct manufacture. There are many trucks running to-day with engines so noisy that it seems impossible that they hang together. Doubtless, much of this noise is due to loose bearings and other parts, but a good deal of it is also due to improper balance. Engineers in recent years have studied the problem of balance and the trucks of good quality which have been turned out in the last 5 years are much better in this respect than the earlier ones.

If the service station is called upon to rebuild or repair one of these earlier engines, it would not seem to be worth while to go to any great expense or time in the matter of securing more quiet running unless this is taken up with the owner in advance. However, in the newer trucks the balancing of reciprocating parts should be watched very carefully in order to finish a job in as good condition as it was received in the station.

In the manufacture of the better grade engines, the pistons and connecting rods are assembled selectively. To make this plainer, the assembler has several hundred pistons on a bench. He weighs these up on scales and marks the weight

## Engine Efficiency

Noise in an engine means abnormal wear and friction.

A quiet engine indicates a balance of the rotating parts.

Read this story. It will help you to smooth out your engine running and thereby save money.

## Are You Interested?

on each one. He then selects, say four, that weigh within  $\frac{1}{2}$  oz. of each other, or even closer. Some of these groups may vary as much as 2 or 3 oz., but as long as all the pistons that are assembled into one engine are about the

same weight the pistons, at least, will balance.

As a rule, the same operations are gone through in the case of the connecting rods and finally, if the work is very high grade, the whole assembly will be weighed up for balance. With all this care in the original assembly, it happens many times, that in replacing one or more of these parts, the repairman pays no attention to these weights and assembles a piston or rod right from stock. This new piston may have a different weight from the others and when the engine is assembled and tested it will be found that it is out of balance and cannot be made to run smoothly.

The remedy for this is precaution in the first place. It takes but a few seconds to weigh up any of the parts on a spring balance, as shown in Fig. 1, and mark them with chalk. If no pistons are found in stock which are the right weight, the heavy pistons should be reduced by taking out some of the metal. This can be done by turning out the inside of the skirt, as shown in Fig. 2, or by drilling the skirt, as shown in Fig. 3.

## Balance of Rotating Parts

In addition to this balancing process there is another balance that has considerable effect on the running of the engine, and that is the balance of the rotating parts. We may assume that the crankshaft itself is balanced perfectly, but if it is not, this can be determined by a crankshaft balancing device shown in Fig. 4. This will determine the static balance, as it is called, but will not determine the running balance. The crankshaft may be called in static balance when it does not come to rest with the same side at the bottom at all times. The running balance cannot be determined with ordinary shop equipment.

In connection with the balance of the rotating parts, the weight of the lower end of the connecting rod must be taken into consideration because this end has a strictly rotating movement, going around with the shaft. The part of the rod between the crank bearing and the wrist pin bearing has a combination of both reciprocating and rotary motion and

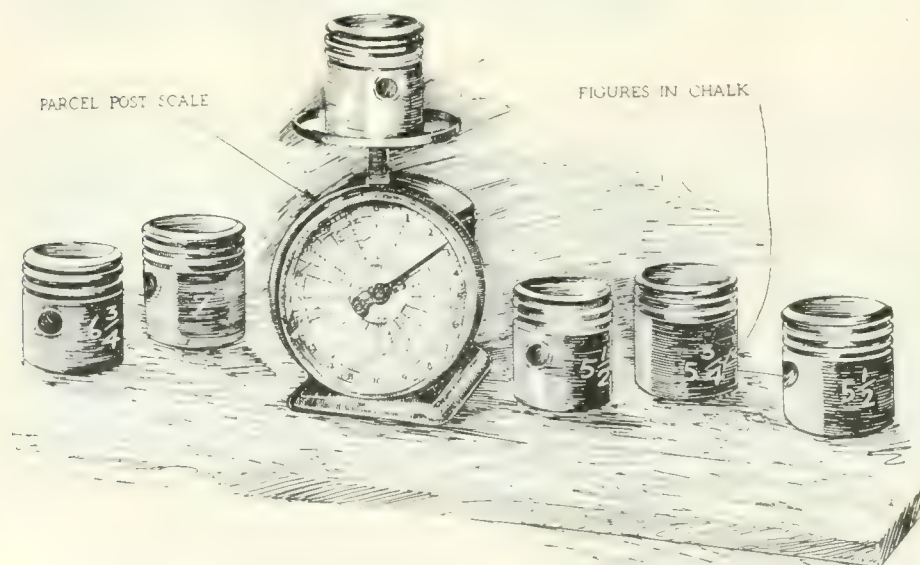


Fig. 1—Balancing pistons by weighing on a parcel post scale and marking the weights in chalk. It is not necessary to mark the pounds, only the ounces



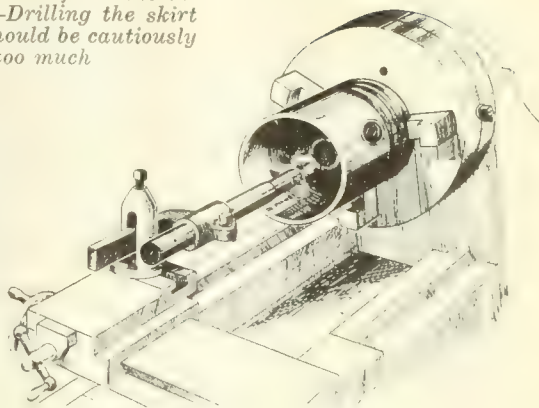
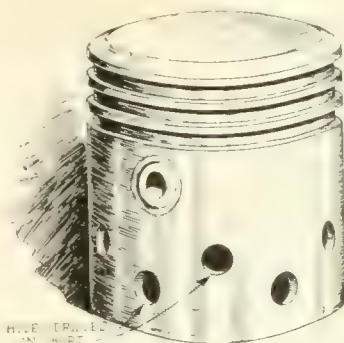
the correct balancing of the rod is determined with the scale and a support, as shown in Fig. 5.

### Effect of Oversize on Balance

Some shops make a practice of rebor-ing, regrinding or lapping one or more cylinders which are scored or in otherwise bad condition and letting the other cylinders go. This may or may not be bad practice according to the make and age of the truck and the grade of work turned out by the shop. In general, it is bad practice to replace one piston oversize because the bore of that cylinder is thereby increased and will deliver more power to the crankshaft than the other pistons will. However, where the amount taken off the cylinder wall is just a skim, say 0.001, the difference will be so slight that it will hardly be possible to detect it. The following table, worked out for several oversizes of a 3¼ in. bore will serve to illustrate how the area increases:

Oversize	Increase in Area, Sq. In.
.001 in.	.006 sq. in.
.002	.011
.005	.029
.025	.148
.040	.236
.100	.597

Fig. 2 (right)—If the piston is too heavy, it can be lightened by turning some of the metal from the inside of the skirt. Fig. 3 (below)—Drilling the skirt will also reduce the weight. This should be cautiously done so as not to remove too much



kets, etc., unequal compression chambers and other things.

Where a first class engine job is wanted, these problems of balance should not be neglected and it is possible with the equipment that is in nearly every shop to correct most of the glaring faults.

The man who has charge of the parts should know some of these things, and there is no reason why he could not, in spare time, weigh up these parts and

mark the weights with chalk so that time could be saved by the mechanic.

Parts supplied by the truck manufacturer are sometimes considerably different than the ones assembled in the truck. Sometimes this is due to the fact that the parts have not been ordered correctly.

It is just recently that considerable trouble has been caused owners of one make of truck due to the fact that the factory makes pistons of two different styles for the same model truck, one with the piston pin hole higher than the other. These are known as high and low compression types. Of course the assembly of one of these pistons in an engine with three of the other type would cause knocking and pounding, and much time might be lost in hunting for the trouble as mechanics are not much given to measuring parts supplied by the factory. All the pistons in one engine should be of the same type.

### Trucks Favored by Live Stock Raisers

CHICAGO, July 20.—A. F. Stryker, secretary and traffic manager of the Omaha Live Stock Exchange, in testifying at the freight rate hearing on live stock before the Interstate Commerce Commission in Chicago during the week of June 13, stated: "The high freight rates are forcing live stock producers to ship by truck. Twenty per cent of the hogs in one day's receipts at Omaha were delivered by truck. On Monday, June 6, 50 per cent of the sheep received at the St. Joseph market came by truck."

It is estimated that more than 3,000,000 head of cattle, hogs and sheep will be transported by motor truck direct from "farm to yards" during 1921, this being based on 1920 figures from seventeen stock yards in the corn belt.

It is predicted that if it were possible to get the actual figures covering the number of head transported by truck from farm to rail siding and then by rail to stock yards, as well as the number of head arriving by motor truck at the dozen of smaller stock yards where no record is kept on stock arriving in this manner, the grand total for 1921 conservatively estimated, would surely reach 6,000,000.

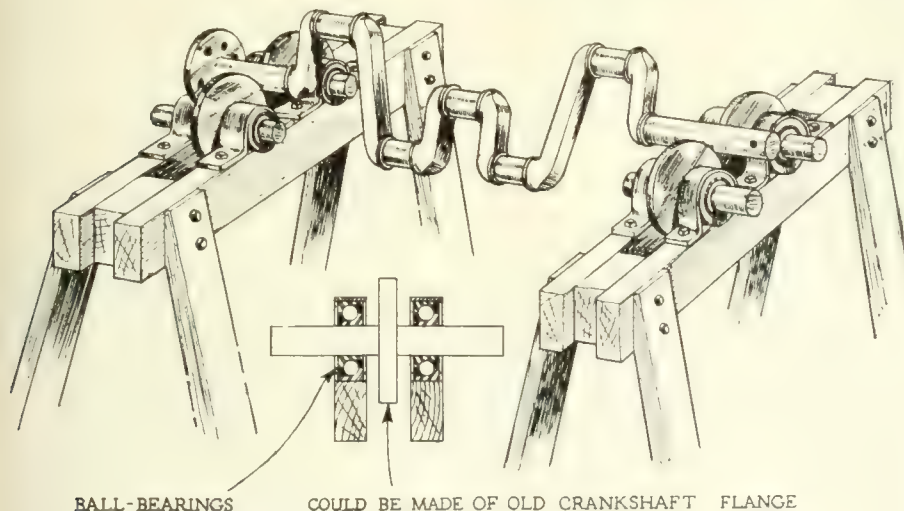


Fig. 4—A crankshaft balancing device which consists of the flanged ends of old crankshafts revolving on roller bearings. The horses are of wood

It can be seen from this that increasing the bore of a cylinder 1/10 in. will increase the area of the cylinder almost 6/10 sq. in., and assuming the stroke of this engine to be 4 in., the increase in cylinder displacement would amount to over 2 cu. in. Figuring the problem out by mean effective pressure, the increase in push on the connecting rod on the .001 oversize piston would be about .3 lb., and in the case of the .100 oversize, 30 lb. pressure. This latter is prohibitive, but there are many other things in an engine that would cause a variation of much more than the first mentioned .3 lb., such as improper carburetion, faulty spark plug, scored cylinder, too wide a gap in piston ring slots, leakage around spark plugs, caps, gas-

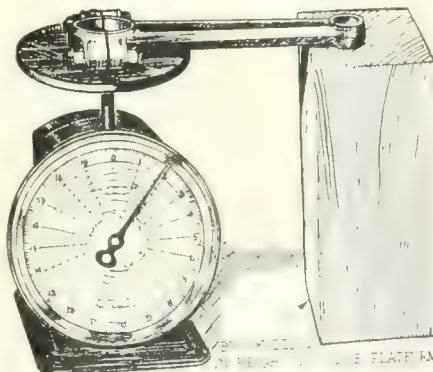


Fig. 5—Weighing the lower end of the connecting rod with the other end supported on a block of wood the same height as the scale



# Crankcase Oil Dilution

Diagnosing Engine Troubles  
Which Are Due to Condensation  
of Liquid Fuel and Leakage  
Past Pistons

VAPORIZING the heavy grades of gasoline on the market to-day presents problems which have to be solved by the carbureter manufacturer and designer, which problems have, for the most part, been successfully met. There is really more power to be obtained from the lower grade fuels than from the more easily vaporized fuels of a few years ago if the most up-to-date equipment be used, but the practical impossibility of vaporizing every bit of fuel, the excessive cooling of the older engines, and the carelessness or ignorance on the part of the operator have brought troubles in an entirely separate part of the engine, the lubrication system.

## Crankcase Dilution Effects

Oil dilution produces a number of different effects in the engine, some of these being in the mechanical parts and in the running of the engine, and others being observable in the oil itself. The most noticeable effect is the thinning out of the oil. This is easily tried out by draining some of the oil from the crankcase. If diluted to any extent it will be very fluid, will pour very easily and will seem not to have any body, but to act more like kerosene in spite of its much darker color.

The diluted oil will have little or no lubricating quality, and this can be roughly tested by rubbing the thumb and forefinger together with some of the suspected oil between. If the ridges in the skin can be clearly felt and if there is a noticeable friction, then it is quite likely that the oil has been thinned out to a point where it has little value as a lubricant. The same test can be carried out by using two small blocks of metal which have perfectly smooth, flat surfaces. A good oil will effectively keep the surfaces apart and the scraping of the block one on the other will hardly be noticed, but with an oil much thinned out by raw fuel, it will not require much pressure to make the blocks scrape.

Another effect produced is that the oil in the crankcase seems to last a very long time without the level going down. In some cases the oil level does not go down at all, and in very extreme cases the level actually rises. This effect is not uncommon in very cold weather.

Aside from the effects noticeable in the oil itself, there is the deterioration

in the engine parts due to the fact that while they have been receiving oil, the oil has no value as a lubricant and is acting more like a cutting oil. Rapid bearing wear with perhaps the burning out of one or more bearings, excessive knocking from loose rods and main bearings, and general noise when the engine runs are among the first effects. If allowed to continue too long, secondary effects

ings and from the cylinders. This sediment collects in the connecting-rod dip troughs, in the sump, in the oil grooves in the main and connecting rod bearings, and finally may clog up the pump or hold the pump valve off its seat, rendering it at least partly inoperative. Still greater amounts may collect in portions of the oil tubes and in the oil indicator.

This sediment settles to the bottom of any hollow place where there is not a very rapid flow or current of oil sweeping past and it becomes quite hard, due to the tiny particles of which it is composed. The heat seems to cement it together and sometimes, after standing for some time, it will be so hard that it is difficult to loosen it with a sharp tool.

## Contributing Causes

Crankcase dilution cannot be absolutely prevented, but it can be reduced very considerably by determining the causes and removing them where possible. The most trouble is caused by using too rich a mixture. It is possible to get a mixture which is almost perfect for combustion purposes, one in which practically every bit of the fuel is burned in the explosion, but such a mixture would be too lean for ordinary running. It would be correct for a certain limited range of speeds and if the range were exceeded or reduced, the engine would stop because the proportion of fuels to air would not be correct for the new speed. Carbureter designers have as far as mechanically possible tried to make the instrument automatic so that it will compensate for these changes in requirements. This is done through multiple jets, floating venturis and auxiliary air valves, but there is such a complication of requirements, that the needs of the engine can only be approximated and the needs of the engine cannot be absolutely exactly met. The consequence is that the mixture always has to be carried a little bit richer than the engine requires for perfect combustion and this excess fuel either goes into the formation of carbon or else slips down past the rings and into the crankcase. Therefore, while we cannot ever expect a perfect mixture, the carbureter should be so set or adjusted that there is as little excess fuel as possible.

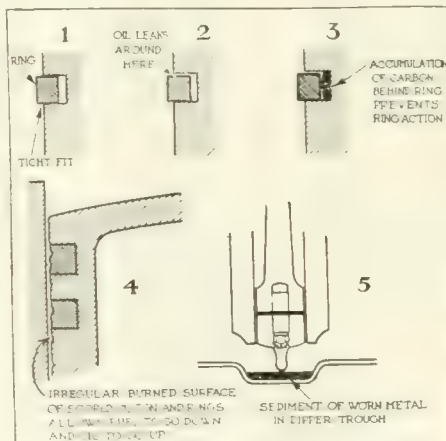


Fig. 1 shows a properly fitted piston ring. Fig. 2 shows a sloppy fit around the ring, allowing oil and fuel to work around in back of the ring. Fig. 3 shows how an accumulation of carbon back of the ring will prevent the ring from acting. Fig. 4 is an exaggerated section of a score showing the space between the cylinder and the rings and piston. Fig. 5 shows how the metal particles settle in the dipper troughs.

will be produced in the springing of the crankshaft, gear noise, etc.

The pistons and cylinders will wear rapidly and when operated at any kind of reasonable speed, the lack of lubrication will cause sticking and scoring of both cylinder wall and piston. This will, of course, groove or burn the outside surface of the piston ring and that cylinder will become an oil pumper, which will still further aggravate the trouble by allowing oil to get into the combustion chamber, fouling the plugs, causing the cylinder to misfire and precipitating a further amount of liquid fuel into that combustion chamber, this running down past the rings and still further diluting the oil.

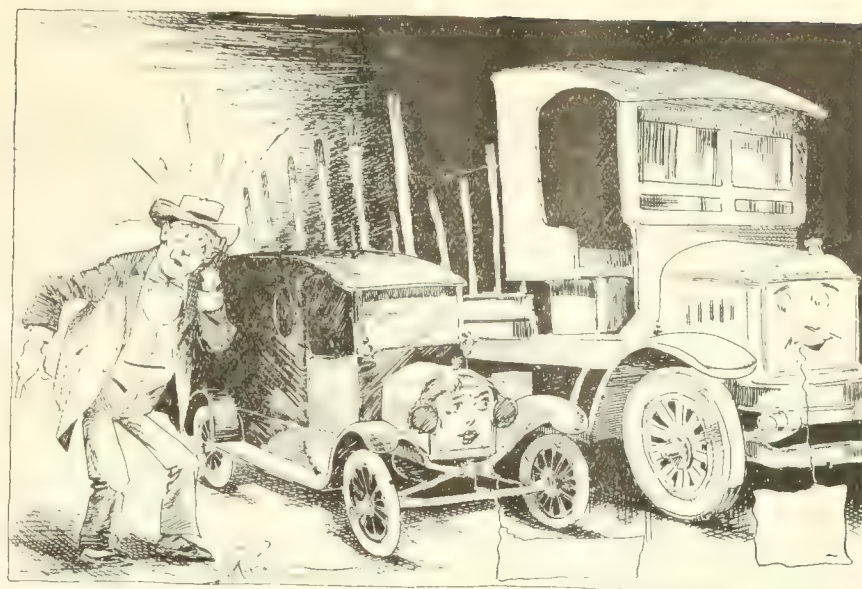
Accompanying the rapid wear of these metal parts is the accumulation of metal sediment which comes out of the bear-



# The Trucks That Had Imagination

By

Sinclair Gluck



ROSS, the garage superintendent, came into the president's office with an expression something like that of the cat that had eaten the proverbial canary. The fleet had been visited by the series of petty calamities which always seem to come together, some of the trucks had been held off their routes and Ross had a pretty good idea that he was in for a few straight and unpleasant remarks from the boss.

But Old Silas Gunther—Old Hammerhead, as the men affectionately called their president—could usually be counted on for the unexpected.

"Come in, Ross," he said, "park yourself in that chair and listen to a little story I have to tell you."

"I want to tell you about a funny experience I had the other night," he began. "You know I stayed down here late last week, looking over the inventory. I didn't get through until about 2 o'clock in the morning. But on my way out, I thought I'd have a little look 'round the garage."

Old Hammerhead paused a moment. "Well sir," he went on at last. "the night man had finished his work and was curled up in one of the cabs. sound asleep. Everything was ship-shape, but as I passed down between the quiet, booming bulks of the big trucks, I heard a rustle and then a sort of a hoarse voice off on my left. Naturally I stopped to listen."

Ross sat up. "Why, who could—"

But Old Hammerhead held up his hand, smiling. "Wait a minute. I say stopped to listen. And when I had located the sound, I made my way over to where the little special delivery Lizzie was parked up alongside our big warehouse tractor. It was the big tractor that I had heard talking."

Ross leaned back in his chair again. "As I came up," Hammerhead went on, "there came another rumble from under the hood of the big tractor: 'Oh, yes, you're hardly treated you are. You do more complaining than all the rest

of us together. And if you do as much work in a month as I do in a day, I'll eat my crankcase!'"

"Then," Old Hammerhead went on, "I heard a little squeaky voice from under the Lizzie's hood. 'Well, I can't help it. That mean old driver of mine hasn't touched my universal grease cups for a month. I get such a pain in my drive shaft every time I go out now that I feel as if I could just sit down and cry.'"

"'Oh, for Pete's sake,' came the voice of the big tractor, 'Turn 'em down yourself, you little fool.'"

"'But I can't!' came the squeaky voice again. 'I've tried to. I've got sense enough for that, I hope. But I can't reach it. I've tried with my torque rod again and again and I even tried to reach it with my reverse pedal. But I can't. I don't know what to DO!'"

"There came a grunt from under the big tractor's hood," Old Hammerhead went on. "And then: 'Well,' the hoarse voice replied, 'I don't know much about your delicate construction. But I suppose it never occurred to you to turn down your precious grease cups with your brake rod cross-member.'"

"There was a muffled squeal from the Lizzie, followed by a rustle and a little clank or two. Then a long-drawn sigh. 'Oh, that feels good!' came the squeaky voice. 'It worked beautifully and thank you ever so much!'"

"'Oh, that's all right!' the tractor answered, in a somewhat mollified voice. 'I know what it's like myself to be starving for a little drop of oil or grease somewhere and have that driver walk right past it every time. But I've found that you can usually reach it yourself, somehow, and help yourself out; that is, if there's any grease there at all.'"

"'I did try,' the Lizzie answered, 'But I never thought of my brake rod. You're so much bigger and stronger and cleverer than I am that I suppose you never have any trouble at all in fixing things when the driver neglects you?'"

"There was a rustle from all over the big tractor and I thought the dark shadow of it loomed up larger still in

the half-light. 'Well, young lady,' the hoarse voice replied, 'I'll admit that I have a little trouble sometimes. But I usually manage to get around it.'"

"'I'm sure you do,' the Lizzie answered. 'But tell me Mister Tractor, don't you think that that Mr. Ross who runs our house is kind of inconsiderate sometimes? It seems to me that if he'd follow up the drivers a little more, instead of being contented with just telling them to be sure to oil us and grease us all over, that they'd take better care of us. I wish he'd inspect us himself now and then.'"

"'Well, he's a pretty busy man, you know. And he takes pretty good care of us as it is.'"

"'I know he does,' the Lizzie answered 'and I think he's awfully good-looking. But if he'd only look us over himself every few days, the drivers would have to take better care of us. Of course we *can* do it ourselves, I suppose, but it's just maddening when you come in tired out from a hard day's work, as you do so often, and want to go to sleep, to have to spend half the night trying to straighten yourself out.'"

"There was no answer to this. And after a moment the squeaky voice came again, more softly: 'Are you asleep, Mister Tractor?'"

"But there was no answer, and presently I heard a little sigh from the Lizzie and then all was quiet."

Old Hammerhead leaned back in his chair and laughed softly. "Of course that's an imaginary conversation, Ross. But it's my idea of what the trucks would say to each other if they could speak—and if they had imagination."

"You see, Ross, I want you to realize that the trucks cannot speak. And that they have no imagination. So we've got to do our best to find out what ails them without their telling us and to do everything that is necessary for their comfort, ourselves. Because they can't do it for themselves. What do you think?"

Ross got up. "I think, sir, that I'll take the Lizzie's advice and inspect those trucks myself every day or two!"

# The Cost of Keeping It Moving!

**This Truck Has Run 100,000 Miles with Perishable Fruit at an Average Cost of \$0.1773 Per Mile Run**

A LITTLE delay on the road—an extra hour or two in the hot sun—and the whole load may be only fit for the dump heap!

That is one of the problems of hauling fruit and vegetables—highly perishable market produce.

If these goods are to be hauled by truck—and they can only be hauled by truck because horses are too slow—the truck must be dependable and must not break down. This in turn means careful maintenance. Fortunately the modern truck is dependable.

It is interesting to learn how one truck hauled these goods without loss, but it is equally interesting to note the extremely low cost of maintenance, under such conditions.

The truck is owned by Piowaty & Sons Fruit Co., South Bend, Indiana. According to the shipping foreman: "Everybody for 30 miles around knows that old Service truck of ours. It has traveled 100,000 miles in the last six years and is still going strong."

## Keep Moving or Spoil

"We are wholesale distributors in this district for fruits and vegetables and do a big business in fruits which are out of season in this territory or not grown here at all. Naturally all this stuff is very perishable and has to be handled quickly to avoid big losses through spoiling.

"Our fruits and vegetables are shipped to South Bend in carload lots and distributed by us through the smaller cities around here. We have seven salesmen constantly covering the territory. As fast as they 'phone in or bring in their orders, we load the stuff on our trucks for delivery to the express offices or straight to the customers themselves.

"Our stuff has to keep moving or spoil. It cannot be kept waiting around shops, warehouses and express offices, but must be delivered immediately. If we want to get our grapes and peaches and pears to our customers looking fresh and attractive, we have to move them fast. A little delay on the road—an extra hour or two in the hot sun—and the whole load may be only fit for the dump heap.

"Because of the slow and unreliable service the railroads have been giving lately, we have been using motor trucks a good deal for delivering to customers

within a radius of 30 miles of South Bend. If the truck breaks down on the road and its load is exposed to unusual heat or cold, the stuff is going to spoil. Therefore, it is necessary to have reliable trucks for this work.

"Our 1½-tonner has paid for itself many times in the produce it has saved

us. It has operated all over our territory and has gone through weather and over roads that would stop a good many motor trucks.

"It hasn't been overloaded to any appreciable extent, but our loads are bulky and shifty and put a very considerable strain on the truck chassis and running

The Commercial Vehicle—Truck Cost System			
Year ending <u>April 1</u> 1920		Make of truck <u>Service</u> Gasoline <u>Electric</u>	
MONTHLY COST SUMMARY SHEETS U. P. C. BOOK COMPANY, INC. 243 249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline <u>2386</u> gals.	\$ <u>25</u>		\$ <u>596.50</u>
Current _____ kwh			
Oil <u>444</u> qts.	\$ <u>15</u>		<u>66.60</u>
Grease _____ lbs.			
Kerosene _____ gals.			
Waste _____ lbs.			
Dist. Water _____ gals.			
Driver <u>280</u> days	\$ <u>4.64</u>		<u>1299.20</u>
Helper _____ days			
Mechanic _____ hrs.			
<b>A—Total Operating Charges</b>			\$ <u>1962.30</u>
<b>Maintenance Charges</b>			
*Tires <u>16,700</u> miles	\$ <u>0.123</u>		\$ <u>205.41</u>
Repairs _____	Estimated @ \$ <u>0.18</u>		
Overhauling, painting, etc.	per mile for <u>16,700</u>		<u>300.60</u>
Spare vehicle rental _____			
Garage rental (pro rata) _____			<u>120.00</u>
<b>B—Total maintenance charges</b>			\$ <u>626.01</u>
<b>Fixed Charges</b>			
Insurance—fire _____	\$ <u>85</u>	per year	\$ <u>85.00</u>
Liability _____		per year	
Comission _____		per year	
Interest _____	<u>6</u> % (On item 1—45) on depreciated basis		<u>57.90</u>
Depreciation on chassis _____			
Depreciation on body _____	\$ <u>0.126</u> per mile		
Depreciation on equipment _____	minimum life of <u>120,000</u> miles		<u>210.42</u>
*Depreciation on tires _____			
Total taxes and licenses _____			<u>20.00</u>
<b>C—Total fixed charges</b>			\$ <u>373.32</u>
<b>Total</b>			\$ <u>2961.63</u>
*Note: Omit one of these			

These are the operating charges, maintenance charges and fixed charges for a year on a 1½-ton Service truck which was engaged in delivering highly perishable fruits and vegetables over a wide area. The costs are laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. At the time these figures represent, the truck had already been in service for a number of years and had run, with the mileage given here, a total of over 100,000 miles. Nevertheless, the estimated charge for repairs is well in excess of the actual repair cost



parts when the going is particularly bad.

"We bought our 1½-ton Service truck April 1, 1914, so it has been working over 6 years. In that time it has covered well over 100,000 miles. For the year ending April 1, 1920, it ran a total of 16,700 miles, an average of 59.64 miles per day operated. It operated 280 days during the year, taking only a comparatively few days out for repairs.

"The first 4 years that we had this truck it cost us very little for repairs—\$100 a year would be too high for that period. In the last 2 years it has had one overhaul and some minor repairs. It is now being overhauled for the second time in 6 years.

### Cost \$0.1773 Per Mile

"We estimate that this second overhaul will make it good for at least another 20,000 miles, but it will probably do even better, judging by its past

### What the System Costs

On these two pages are shown filled-in sample sheets of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system, including binder, 500 cards and 50 sheets is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

performance record. This record is especially remarkable because we have had to work the truck hard ever since we got it.

"For the year ending April 1, 1920, the Service cost us \$10.58 per day to operate. The cost per mile was \$0.1773. Deducting the driver's wages, this 6 year old Service is costing us only \$5.94 per day for 59.64 miles per day, or just under 10 cents per mile to operate. That would be cheap hauling under any conditions, in spite of the necessity of keeping the truck in good repair, running it fast and far and running it over all kinds of roads in all kinds of weather."

An analysis of the costs shown on these pages, laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks, brings out some interesting details of the cost of operating a truck under these conditions, in the hauling of perishable fruit, produce, etc.

The truck used 2386 gallons of gasoline in running 16,700 miles. This works out at an average of almost exactly 7 miles to the gallon. Considering that this includes all stops, traffic slow-ups, starting engine in the morning and gasoline used while standing with the engine running, this is a pretty good record.

The truck used 444 qts., or 111 gallons, of oil in running the same distance. This means about 150 miles to the gallon, a liberal allowance for a truck on long runs, but well worth while. It probably had a good deal to do with the very low repair cost of the truck during the period.

### Tire Costs Also Low

The tire cost of \$.0123 per mile looks pretty low at first glance. But this figure is not an estimated amount. It is based on the actual cost of the tires in the first place and the performance of those tires before they were discarded—in itself a valuable record.

The cost for repairs is estimated at \$.018 per mile. This works out at about \$300 per year. If this amount has been charged against the truck each year, the total charge for repairs will be much too high, if the truck is only run another 20,000 miles. The truck may have cost \$300 in repairs this last year, but certainly did not cost anything like that in the preceding years and can hardly make up the difference in the next 20,000 miles of running, even if it were economical to run it at so high a cost, after it has been fully depreciated.

Lastly, the interest on the investment is an interesting item as it is figured correctly on a depreciating basis, instead of on a flat basis. That is, instead of charging the truck each year with 6 per cent on the original investment of \$1700, which would be \$102 in interest, the amount the truck is depreciated each year is deducted from the previous figure of the investment, and the interest is then figured on the result. These yearly interest figures are then added together and averaged, for the final yearly interest charge.

### The Commercial Vehicle—Truck Cost System

Number of Truck 278  
Capacity in lbs 3000

Chassis No. \_\_\_\_\_

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 241-249 WEST 39TH ST. NEW YORK

#### Investment

Cost of chassis, less tires	\$1515 00
Cost of body	
Cost of equipment	
Cost of tires	185 00
1—Total cost, complete	\$1700 00

#### Performance Record

2—Days operated	280
3—Days idle	85
4—Days maintained (Item 2—Item 3)	365
5—Total hours operated	2240
6—Total miles covered	16,700
7—Total trips made	(Estimated @ 3 per day) 840
8—Total tons or packages or stops	(Estimated @ 1½ ton per trip) 1260

#### Performance Averages

9—Average miles per day maintained (Item 6—Item 4)	45 75
10—Average miles per day operated (Item 6—Item 2)	59.64
11—Average miles per trip (Item 6—Item 7)	19.88
12—Average tons, stops or packages per trip (Item 8—Item 7)	1.5
13—Average commercial ton miles, package miles or stop miles per trip	(Item 11 x Item 12) 14.91

#### Recapitulation

14—Total expenses for month (Sum of Items A, B and C)	\$2961.63
15—Cost per day operated (Item 14—Item 2)	10.58
16—Cost per day maintained (Item 14—Item 4)	8.11
17—Cost per mile operated (Item 14—Item 6)	.1773
18—Total commercial ton-miles, package miles or stop miles (Item 7 x Item 13)	12524.4
19—Cost per commercial ton-mile, package mile or stop mile (Item 14—Item 18)	.2365
Cost per ton (Item 14—Item 8) ÷ 3	23505

The total cost of operating the truck for the year in question was \$2,961.63. This is not a high figure for operating even a new truck of such a capacity in other types of work, while this truck was engaged in work which placed a heavy strain on it. It also ran up a very respectable yearly mileage, in spite of the fact that it was already entirely depreciated on the books. The cost per day operated is by no means unusually high—\$10.58—while the cost per mile is quite low, due to the high mileage. So is the cost per commercial ton-mile—\$.02365—and per ton—\$.235.

# The Better Way

## To Save Time in Truck Repair and Maintenance

### No. 512—Foot Operated Bench Vise

HERE is a device that saves much time in bench work. This foot operated vise makes possible the use of both hands in handling work and tools. A feature of the device is its quick gripping, made possible by the wedge action of the V-shape member on the two jaws of the vise.

The action of the leverage is simple. Pressure of the foot on the pedal raises the V-shaped piece, thus spreading the arms of the jaws. The latter swivel on bolts so that when the arms are spread the movement of the jaws will be inward, thus giving pressure on the tool or other piece to be held. After the grip is once made it is not necessary for the mechanic to keep his foot on the pedal in order to keep the piece stationary. It is possible for him to leave the piece in the vise and go to some other place in the shop. This fixed pressure is accomplished by a notched piece bolted to the lower part of the bench leg and so located that it will hold the pedal in different positions to suit the opening of the vise jaws.—W. HAIGHT, Chicago.

### No. 513—Fuse Tester for Truck Shop

A SIMPLE tester to prove conclusively at a glance to the fleet superintendent or owner that the fuses purchased are good or defective consists of two strips of brass placed on the top of a counter, bench, or wall with the strips so placed that the space at the upper and lower ends is a variable distance. In other words, the strips are slanted.

At the upper end a small test lamp wired to one strip and to a battery is out of circuit until a fuse is placed between the strips, the other of which is wired to the battery.

When arranged as shown in the accompanying illustration, any size fuse may be tested immediately. One dry cell will serve as a battery where a small one cell lamp is used in flash lights.—W. WARNER, New York City.

### No. 514—Drill and Reamer Rack

A RACK constructed like a very shallow box with thin strips of wood for partitions makes a handy place to keep drills and reamers. It may be mounted on brackets near the bench,

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

drill press or lathe. A hinged cover may be fitted.—L. ROACH, Harrisburg, Pa.

### No. 515—Wide Range Bench Vise

HERE is a vise that will take 24 in. between the jaws. Any shop man can readily see what a handy thing it is to hold different parts while assembling or disassembling, tapping holes and performing other work on large castings, parts, etc.

The vise is simple to make and is best made of  $\frac{3}{4}$  by 4 in. bar stock. It consists of three parts, two jaws, and a frame or body, this being made in one piece to set into the bench top. It is best to form the support for the jaw screw. A series of holes are drilled and tapped in it for the securing of the rear jaw at any desired place.

The vise should be bolted near the end of the bench to give best results.—A. WHINNERY, Grand Rapids, Mich.

### No. 516—Hook Fastener for Tire Chains

HOOKS on the ends of heavy pneumatic tire chains are fastened by drilling a small hole through the clasp

and inserting a cotter pin, the ends being spread. Trouble is often experienced by truck drivers while out on the road through chains coming loose. This is expensive, as it means delay in delivery. The use of a cotter pin will solve the problem.—J. W. TANNEHILL, Norfolk, Neb.

### No. 517—Storage Battery Steamer

ANY number of ways have been devised for steaming out batteries and with few exceptions all of them have been successful. The latest is shown in the accompanying illustration. This steamer is made from an old hot water heater with the bottom end set up just enough to make room for a fire box and fitted with a gas furnace. The other parts are an old gasoline tank, wood box and hose connection. The amount of steam is regulated by the cock which controls the flow of water from the tank. The latter is supported on the wall high enough to give the water sufficient flow.—F. B. POTTER, Potter Brook, Pa.

### No. 518—Compression Relief for Overhead Valves

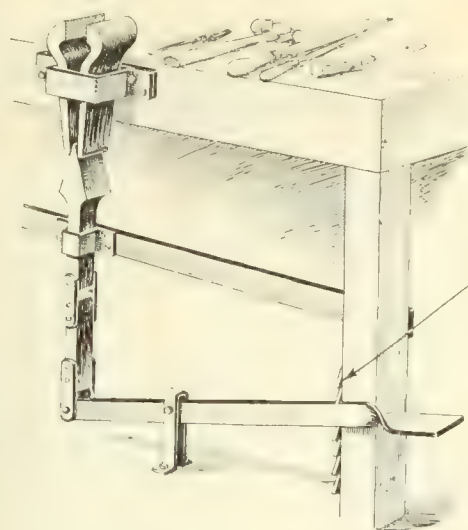
WHEN working on an overhead valve engine, it is sometimes hard to crank by hand on account of the compression. It is also difficult to turn the engine to any set position which is most desirable in timing, etc. Without petcocks, the only way in which to release the compression would be by taking out the spark plugs. The method shown in the accompanying illustration is simple and a time saver. It is a matter of some seconds to insert washers between the rocker arms and the valve stems. This holds the valves off their seats and allows the compression to escape.—P. A. HARTLEY, St. Charles, Mich.

### Clear the Desks

ONE of the best short cuts to shop efficiency, as far as the truck superintendent is concerned, is a neat desk. Neatness and order are of great importance. Everything should be in its place. Papers should not be allowed to accumulate.

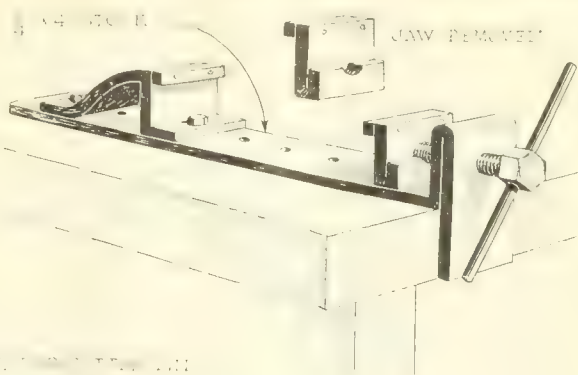
The end of every day should see a desk that is absolutely clear of papers. Some arrangement should be made for files in order to provide for the systematic storage of papers. It is much easier to go to the files for an office note that must be referred to, than to paw through a pile of papers or to search through many pigeon holes.





No. 512

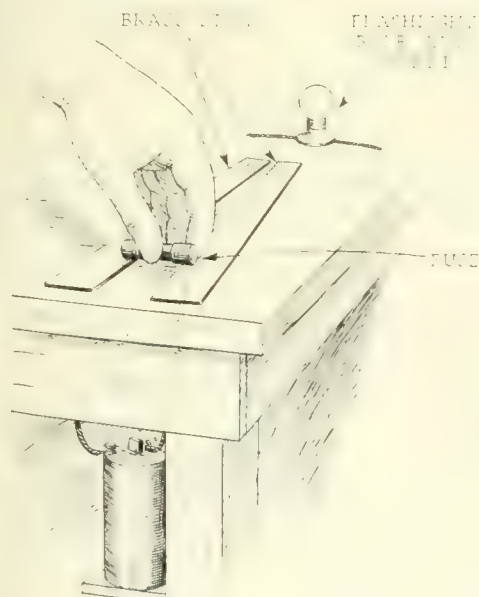
NOTCHED PIECE  
TO HOLD PEDAL  
IN DIFFERENT  
POSITIONS  
AND TO HOLD  
IT FROM SWAYING



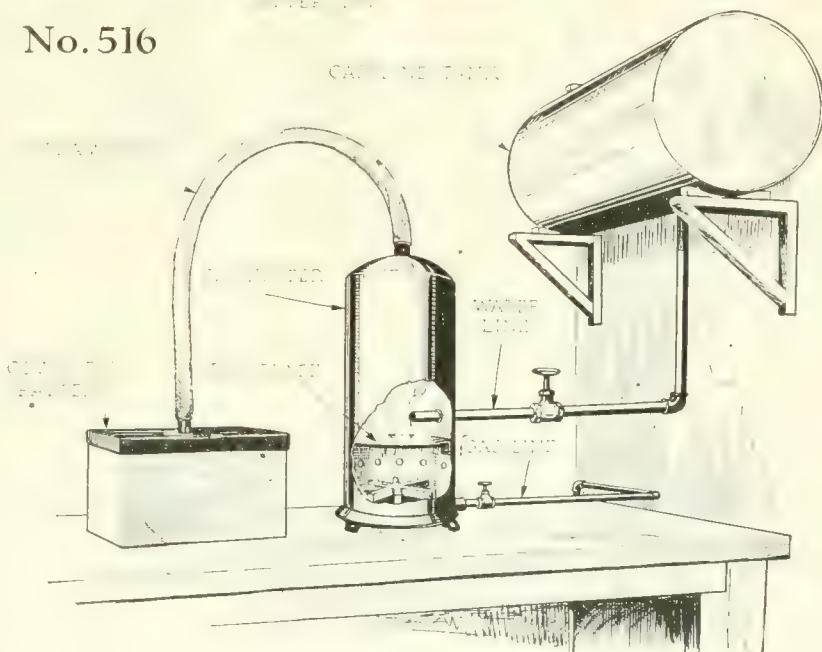
No. 515



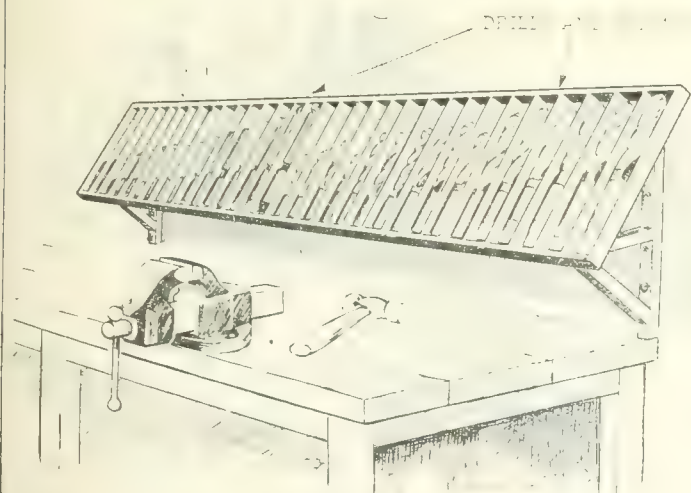
No. 516



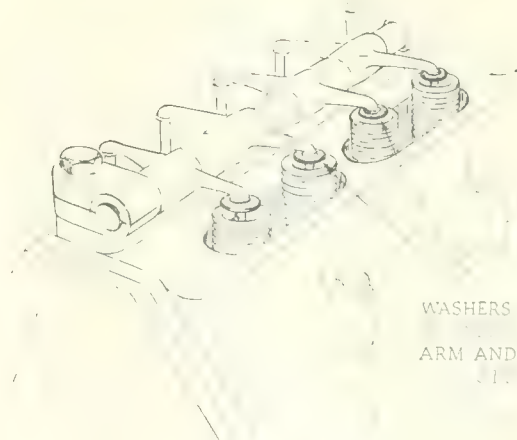
No. 513



No. 517



No. 514



WASHERS PLACED  
ON  
ARM AND VALVE  
STEM

No. 518

### No. 519—Holder for Shop Tags

**T**RUCK garages or repair shops that record the daily work that is performed outside as well as inside often use tags for notations. It is important that these tags be kept in a neat and orderly fashion, otherwise the system will fall down in efficiency. The accompanying illustration shows a good method of taking care of shop and other operating cards.

The holder is made from a small piece of wood with a nail extending from the top. The head of the nail has been cut off. A rubber band cut from an inner tube holds the tag on the board at the bottom.

By keeping the tags in numerical order on the holder, the truck superintendent is given full opportunity for quick and easy reference when desired. He is not forced to waste his time looking through his desk for the tags and he is assured by a brief glance whether the records have been made out by his mechanics or drivers.—D. WAGGONER, Lawrence, Kan.

### No. 520—Clamp for Keeping Hub Cap Tight

**W**HEN difficulty is experienced in keeping the hub caps tight, a good remedy would be to use a band of strap iron,  $\frac{1}{2}$  by 1 in. with a  $\frac{1}{2}$  in. draw to fit the groove. This is then placed around the cap. Slotting the cap with a hack saw and drawing up on the bolt will bind the threads and lock the cap.—S. NOBLE, Redlands, Cal.

### No. 521—Riveting a Ford Band

**T**IME may be saved in the riveting of a Ford band by placing it around an old low speed or reverse drum, tightening the jaws of the vise against the lugs on the band. The rivets are then driven in against the drum.—E. FENDER, Wallace, Ind.

### No. 522—Good Way to Carry Spare Hack Saw Blades

**H**OW many times have you wasted your valuable time looking for spare hack saw blades? How many times have you found them mixed up with other tools and when not wanted generally in the way or broken? It is possible to eliminate all of this bother and waste of time by taping a few to the frame of the saw. They are then safe and secure in the kit kept in the shop.—A. A. LOBROVIC, Brooklyn.

### No. 523—Cutter for Washers and Large Holes

**A** CUTTER that can be used in making washers or for cutting holes in instrument boards is made from an old square shank drill, a piece of  $\frac{1}{4}$ -in. square tool steel and a pin for a guide.

The drill is threaded to hold the tool in place.—A. G. RAABE, Long Island City, N. Y.

### No. 524—Protecting the Driver's Seat

**I**T is important in certain lines of truck transportation that the driver's uniform be always clean and especially free of oil and grease. A neat appearance is sometimes contingent upon whether a mechanic has been testing the truck or not. Complaint is often heard by drivers of delicatessen trucks that uniforms are often spoiled because some thoughtless mechanic has occupied the seat of his truck with a greasy uniform on. He has probably taken the truck out for a test run prior to turning it over to the driver for his daily run and has then forgotten to see whether he has left any grease spots on the seat.

Frequently this means delay, for the driver must look for a spare clean uniform before starting out on the trip. As these uniforms are often white, any spots, such as are made by oil and grease, will stand out prominently. In the handling of food products such as meats, bread, etc., a spoiled uniform is most undesirable.

To protect the driver's seat from the mechanic's dirty clothes, several large aprons with loops for arms and a belt with snap fasteners will serve the purpose. This method allows the apron to be quickly put on or taken off.—C. R. PIERSON, Medina, N. Y.

### No. 525—Keeping Ford Clutch from Dragging

**W**HEN the plates of the Ford clutch become worn so that there is contact over the entire surface when the clutch is in neutral it is found that they are liable to refuse to separate, and will cause creeping.

A temporary cure for this is topeen one-half of the plates by putting them on an anvil and striking them one sharp blow on each side.

This gives plate a slight curve so that when assembled the clutch can be compressed slightly, and will separate of its own accord.

This operation usually gives the plate an expansion of between 1/32 and 1/16 in. which is sufficient to break the suction of the oil and free the clutch. This will not cause the clutch to slip when in high gear.—N. A., Chicago.

### No. 526—Removing Stuck Rear Wheel

**F**REQUENTLY when wheels are found stuck to the shaft, the mechanic working on the job will try to accomplish its removal by hammering on the shaft. One of the difficulties that he frequently encounters from hammering is the marring of the threads.

A better way would be to use an old shaft with the castle nut pinned on. This should be screwed onto the other shaft and the hammering done on the end of the stub.—C. F. HARTWIG, Seattle, Wash.

## How to Get Full Value From the Short Cuts

**N**O doubt after looking over the short cuts in this and previous issues, many of our readers have recalled experiences on the road or in the shop when the ideas set forth in THE COMMERCIAL VEHICLE would have come in handy as time and labor savers. Probably during the time that some problem has arisen and in need of immediate solution, you have remembered reading how the particular difficulty was overcome by some reader of this magazine. Nine times out of ten your memory fails you as to the exact way in which the reader accomplished the work and no doubt you have forgotten when it appeared. Rather than take the time to look through the back issues you proceed with the work in hopes that you will finally hit upon a plan that will be successful. In the end your solution may be as good, perhaps better, than the reader's, but it has been gained only at the expense of time and worry.

### The Better Way

If you are in charge, for instance, of a fleet of Fords, every short cut dealing with that make of vehicle will therefore be of interest to you. The question then is: Will you trust to your memory for future use of the short cuts or will you file them in some systematic way so that

it will be possible for you to quickly refer to them when the occasion arises?

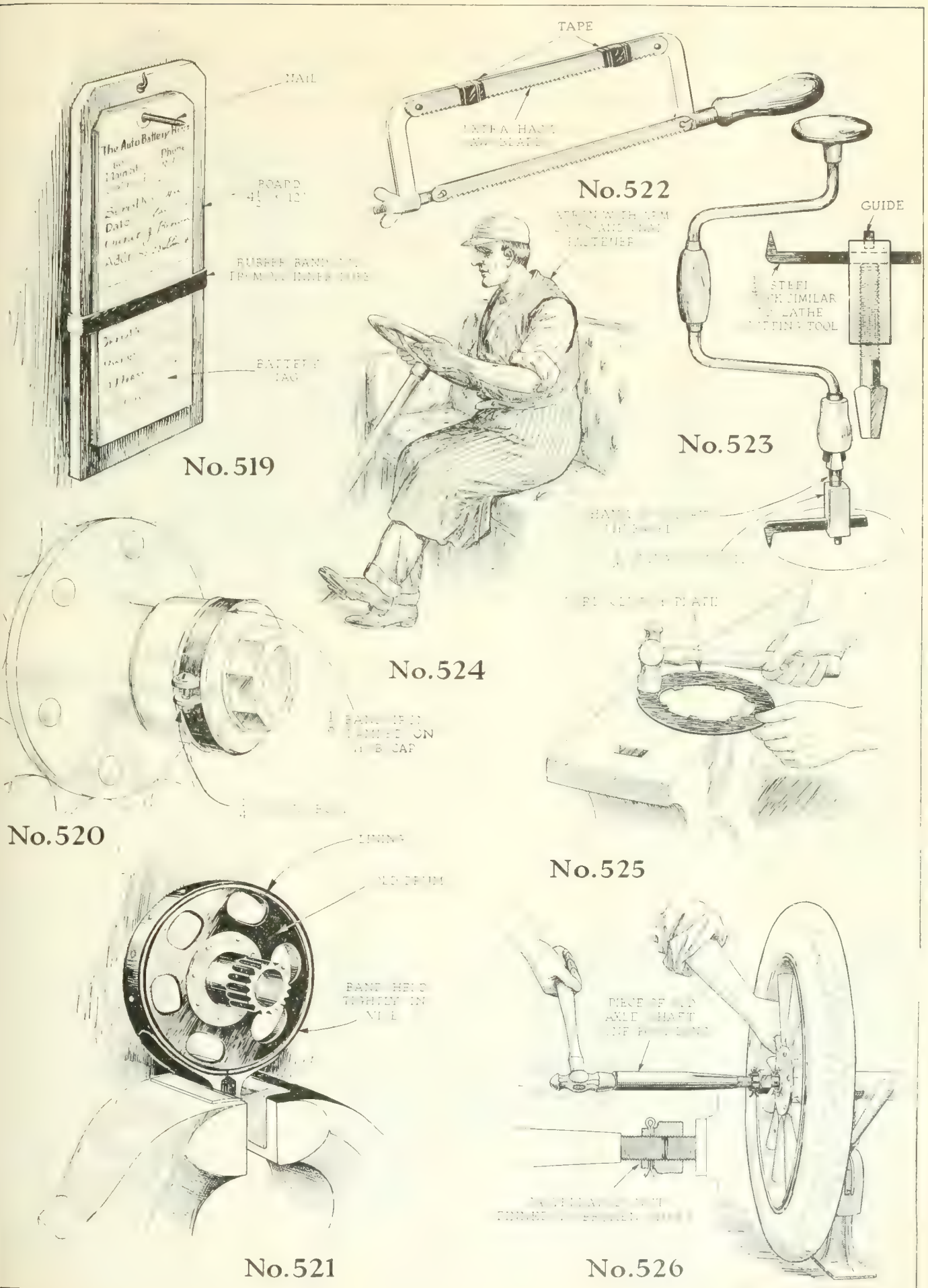
The latter plan is obviously the better way and it applies to everything that appears to have any value so far as your truck operation or maintenance is concerned.

### Concrete Roads for Bay State

**B**OSTON, March 2—Main State roads are to be built both wider and stronger through Massachusetts. The State, working through the highways division of the Department of Public Works has advanced one notch higher its standard for its best class of highway and the coming spring will begin construction of reinforced concrete roads 20 ft. wide and 6 to 7½ in. thick, with hard shoulders. Such roads are expected to carry the heaviest trucks with ample room for all kinds of traffic.

The new type of road, it is stated by the commissioners, is the strongest that the highway engineers know how to build, short of the type used for heavily traveled city streets, which consists of granite block with a concrete base. The method of the reinforced concrete construction will be similar to that used in concrete buildings. It will be the first time Massachusetts has used steel reinforcements in its roads.





## Buyer's Department of The Commercial Vehicle

### Walter Now Building Electrics as Well as Gasoline Trucks

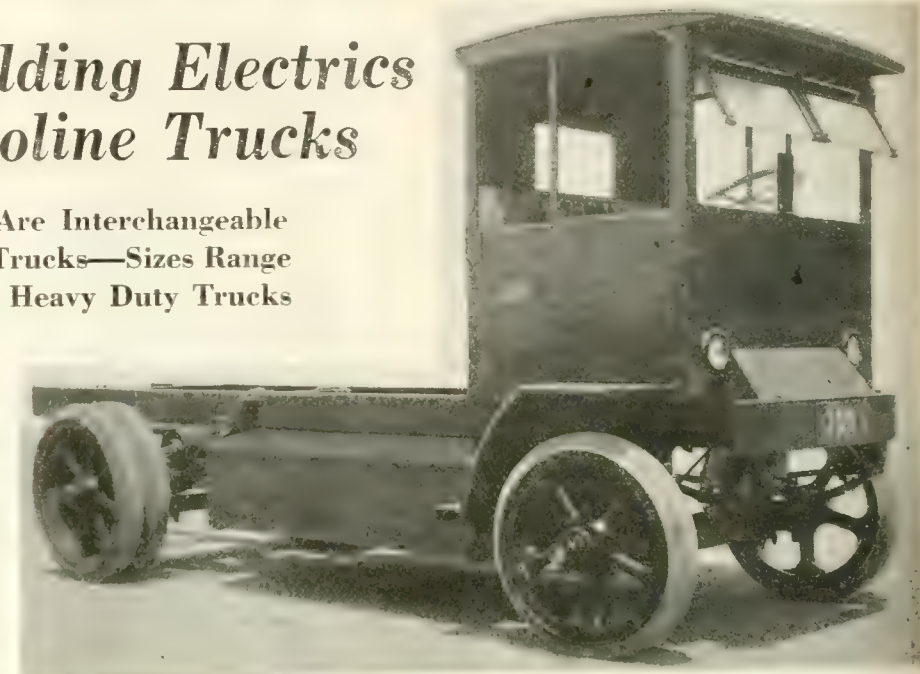
**Units in New Electrics Are Interchangeable with Those in Gasoline Trucks—Sizes Range from 1,500-lb. to 7-ton Heavy Duty Trucks**

FLEET owners who are interested in standardization in truck design from the standpoint of economy in service will be interested in the new line of electric trucks recently placed on the market by the Walter Motor Truck Co., New York City.

With the introduction of the Walter electric units, offered in a full range of sizes, from the 1500-lb. and 1-ton light delivery units to the 2, 3½, 5 and 7-ton heavy duty trucks, the fleet owner is offered a full line of both gasoline and electric trucks, having an absolute interchangeability of parts throughout, except so far as pertains to their respective motor parts.

The new electrics are equipped with the positive locking differential, well known to the users of the Walter gasoline vehicle. This differential, it is stated, assures full traction with both wheels, but permits of the compensation necessary for satisfactory motor vehicle operation when turning. A test to prove the efficiency of this differential is made by the company along the following lines:

A chassis having a load of 11,600 lbs. is driven up to a block 10 in. high. This block is so situated that it comes in contact with only one wheel. The other



*The new Walter electric, which is equipped with the positive locking differential used in the gasoline trucks*

wheel is fully engaged in grease. The truck is then driven over the block, traction being obtained by the single wheel in contact with the block (of course, no traction being obtained from the wheel turning in grease).

Owing to the differential driving both wheels equally, it acts as a constant brake equalizer, and three of the four brakes may be put completely out of adjustment, and yet upon application of the single brake that functions, the wheel will lock and the truck skid in a straight line on wet asphalt.

The rear wheels are toed in, or cam-

bered, to make allowances for the crowned roads. Through this toeing in, the weight of the truck, as well as the merchandise load, is distributed equally on all four tires of the dual-tired equipped rear wheels, rather than on only the inside tires.

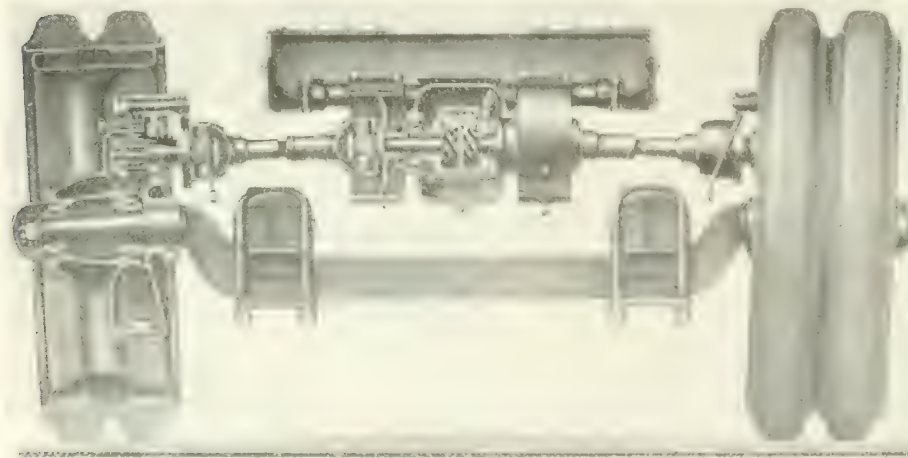
The 2-ton electric, Model EN, costs \$2,900. It has a 114-in. wheelbase. Other specifications include a pressed steel frame, solid tires, General Electric motor, Bethlehem metal wheels and Ross steering gear.

The tire sizes are 36 by 4 in the front and 36 by 3½ in. in the rear. The battery location is under the frame amidships. The motor location is in the rear. The vehicle has a speed of 16 m.p.h. when not loaded and 13½ m.p.h. when loaded.

The controller location is under the seat. The controller lever location is between the seats. The steering wheel is at the left.

The 5-ton model costs without the battery \$4,350. It has a 140-in. wheelbase and is mounted with 36 by 6-in. tires on the front and 40 by 6 duals on the rear. The location of the battery, motor, controller and controller lever is the same as on the 2-ton model, outlined above. This model uses Dayton wheels.

The mileage per charge when light with both models is 60. When loaded it is stated the trucks will go 50 miles. Hycap, Ironclad or Edison batteries are specified in the equipment of both the 2- and 5-ton models.



*Cross section view of the Walter positive locking differential. The rear wheels are toed in or cambered*



# Buyer's Department of The Commercial Vehicle



### AJAX SPECIFICATIONS

Capacity, tons	1 1/2
Price	\$2,250
Wheelbase, in.	134
Tires, front	34x5
Tires, rear	36x6
Bore, in.	3 3/4
Stroke, in.	5 1/2
N. A. C. C. h.p.	22.5
Speed, m.p.h.	25
Gear ratio in high gear	7 1/2 to 1
Final drive	Worm

*The new Ajax 1 1/2-ton worm-driven model, which is equipped with disk wheels*

## Ajax 1 1/2-Ton Truck Is Worm-Driven

**Equipment Includes Cab, Starting and Lighting, Pneumatic Tires, Tire Pump, Motometer and Tool Kit**

A NEW 1 1/2-ton worm-driven speed truck is being built by the Ajax Motors Corp., Boston. The price of this model, complete with cab, starting and lighting system, disk wheels and pneumatic tires is \$2,250. Other standard equipment includes an electric horn, motometer, Kellogg tire pump and tool kit. The cab is of the inclosed all-weather steel type, with a ventilating windshield.

The truck is an assembled product, and includes a Weidely four-cylinder overhead-valve engine, Westinghouse starting and lighting and ignition system, Stromberg carburetor, G. & O. radiator, Merrill springs, Timken front and rear axles, Parish frame, Fuller clutch and gearset, Hartford propeller shaft and universal joints, Smith wheels, Ross steering gear and Monarch governor.

The cylinders are cast in block. The crankshaft main bearing at the rear is 1 1/2 by 4 in.; the front and rear bearings are 2 1/2 by 2 1/2 in. The connecting rod bearing is 2 by 2 1/4 in. Force feed lubrication is supplied through a drilled crankshaft to all of the bearings, a geared oil pump being used. A special built-in water pump circulates the water through a horizontal finned tube type of radiator. Gasoline is fed by gravity

from a 20-gal. tank, located under the seat.

The three-speed selective gearset is a unit with the engine. Drive from the gearset to the rear axle is through a two-piece tubular driveshaft, equipped with three universal joints. The center joint is supported by a ball-bearing

bracket. Propulsion and driving torque are taken through the semi-elliptic springs.

The springs are bronze bushed, with graphite oilless bushings. Emergency and service brakes are both of the internal expanding type on the rear wheels.

## Internal Drive and Worm Axles on Huffman Trucks

THE Huffman truck, made by the Huffman Bros. Co., Elkhart, Ind., is an assembled job which is produced in two models, both of which are rated at from 2000 to 5500 lb. Model C, which has an internal gear rear axle, is listed at \$1,795, and Model B, which has worm drive, sells for \$1,995.

In the Model C, the engine is a four-cylinder Buda with 3 3/4-in. bore and 5 1/2-in. stroke, and the brakes are internal expanding and external contracting. In the B, a four-cylinder, 3 3/4 x 5 in., Continental engine is used, and the brakes are both internal expanding.

The engines are equipped with Eisemann high tension magnetos with impulse starters, and Zenith carburetors with automatic hot air connection. Both the clutch and gearset are of Fuller make. The tires are Firestone solids, 34 x 3 1/2 in. front and 34 x 6 in. rear. The wheelbase is 140 in., and the space to the rear of the driver's seat 10 1/2 ft. Standard equipment consists of seat and riser, tool box, tool kit, horn, and oil side and taillights. Pneumatic tires, bumper, acetylene or electric lighting, open or closed cabs, and bodies are furnished at additional cost.

# Buyer's Department of The Commercial Vehicle

## Kil-Nock Bearing Adjusters

WHAT is claimed to be a sure cure for knocking connecting rod bearings has been introduced to the trade by the Kil-Nock Co., Davenport, Iowa. The device consists of a pair of specially designed bolts and nuts which take the place of those regularly supplied with the bearings. Interposed between the nut and the connecting rod cap is a blue steel piano wire spring which keeps a constant, even pressure on the cap, automatically compensating for wear as it occurs. In applying Kil-Nock, all shims are removed as it is claimed that the semi-flexible effect of the springs renders shims unnecessary.

## Veeder Hub Odometer

THIS instrument always adds mileage whether the truck runs forward or backward. It seals onto the hub and it is impossible to disconnect the instrument by throwing the gears out of mesh.

Parts that are subject to the hardest wear are made of hardened steel. The studs on which the dial revolves are of copper nickel alloy and will not rust or corrode.

There are five dials indicating miles, and one registering tenth of a mile, recording to 100,000 miles, then repeating. No oil or axle grease can leak in on these dials as a stuffing box prevents it.

The dials are locked and prevented from turning except when driven by the mechanism. The locking mechanism is similar to the so-called "Geneva motion," and has been employed in the Veeder counting mechanism for many years.

The price complete is \$20 and the maker is the Veeder Mfg. Co., Hartford, Conn.

## Thermo Carbureter

THE only change in the new model E Thermo carbureter from the previous model A type is in the air valve. The air valve spring and controlling mechanism has been eliminated and an air loaded piston type of valve substituted therefor. The new air valve consists essentially of a loose fitting piston cup to which is attached the valve plate and stem. The piston works in a sleeve extending from the cover of the carbureter and is loose fitting so as to enable air to escape freely around it. The entire action of the valve is governed by the differential between the air pressures above and below the valve, as will be seen in the accompanying illustration.

When the engine is running normally a suction is created in the carbureter which results in a partial vacuum above the valve plate and also (because of the escape of air around the piston) in the

## Truck Equipment

chamber above the piston. The air at the intake which is at normal atmospheric pressure rushes in to equalize this partial vacuum and in so doing forces the valve and piston upward. The extent to which the valve rises under these conditions is directly proportional to differential in pressures above and below the valve. The maker is the Thermo Carbureter Co., Chicago.

## Aro Stop Indicator

THIS is an electrical signal device that attaches to the front and rear fenders. It instantly signals those in front and those in the rear, notifying them which direction is to be taken or when a truck is to be stopped. It is controlled by a simple switch box, fitted to the steering post, within easy reach of the fingers. It is made of aluminum, fitted with lenses and encases a powerful electric bulb connected with the lighting system. A pair of front and rear signals costs \$30. Rear signals cost \$18.50. The maker is the W. J. Smith Co., 1834 Broadway, New York City.

## Cannon Pump Oiler

THE valves of the oiler are submerged in a horizontal position at the bottom which insures that they will be constantly primed. The oiler body is drawn from one piece of steel and copperized. A screen is arranged at the top of the oiler to eliminate foreign substances. The spout connection to the discharge cylinder is made by means of a heavy threaded cup. The bottom of the body is double seamed and the handle is attached in the usual manner. The pump cylinder discharge pipe and valve seats are made of brass. The maker is the Cannon Oiler Co., Keithsburg, Ill.

## Critz Pressure Lubricator

THIS lubricator is constructed of heavy gaged brass. The screw and high pressure parts are made of extra grade steel. The small diameter barrel makes high pressure easily obtainable and the patented ball check head overcomes all complication. By means of fittings supplied, every bearing is easily accessible without the use of flexible conductors.

The patented head makes it possible to operate the lubricator with one hand by simply turning the handle to build up pressure in the gun and by slipping the head over the nipple, the bearing is sufficiently lubricated for ordinary purposes.

Where a quantity of grease is required

the head is slipped over the nipple and the latch snapped, locking the head to the nipple and allowing as much grease as is required to be forced into the bearing by turning the handle. A pressure of 1500 lbs. is developed, sufficient to force the lubricant into any clogged bearing.

The installation is easily made by unscrewing the grease and oil cups and replacing them with one of the fittings.

The Critz system is manufactured by the Lathan Auto Supply Co., San Francisco, Cal.

## Speederator

THIS device consists of a cross rocker shaft located behind the foot pedals and supported by a bracket. On the shaft are two fingers immediately behind and in connection with the slow speed and reverse pedals, the position being such that a movement of either pedal rotates the cross rocker shaft. Rotation of the shaft opens the carbureter valve by means of a vertical arm on the shaft and a connecting rod to the carbureter. A spring keeps the carbureter valve closed and takes up all lost motion. The foot throttle used for operation on high speeds is clamped on the center of the cross shaft and projects through the finger hole in the floor boards. A special rod is supplied in place of the regular rod on the truck. The price is \$4.85. The maker is the Perrin Metal Parts Co., Detroit.

## Ford Carbureter Control

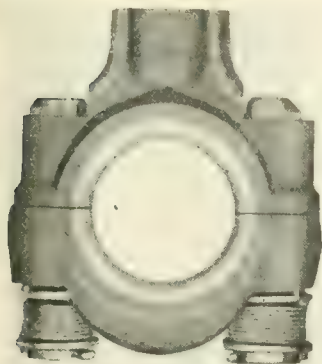
BETTERING fuel economy and engine efficiency is the object of the standard carbureter control offered by the Standard Thermometer Co., 65 Shirley Street, Boston. The device is designed to be mounted on the instrument panel of all models of Fords and attached to the needle valve adjusting rod by means of a suitable linkage, part of the outfit. The dial of the instrument is divided into graduations, numbered from one to eight and a removable pointer, connected with the extension adjusting rod is marked with the words "More and Less" on the left and right hand sides.

## Universal Piston Rings

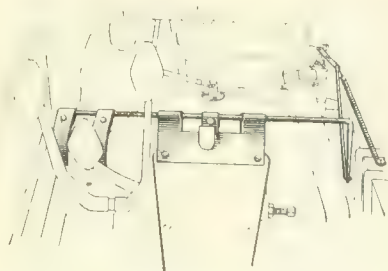
THE claims made for this one-piece ring are that being eccentric it fills the piston groove snugly and exerts an equal pressure on the cylinder over its full diameter, thus equalizing wear. The bevel top edge has the effect of collecting lubricating oil and distributing it in an unbroken film during the down stroke of the piston. A recess in the ring just above its center also retains oil and forms a gas pipe seal. Universal rings are supplied in all standard steel and over sizes. The maker is the Universal Machine Co., Baltimore, Md.



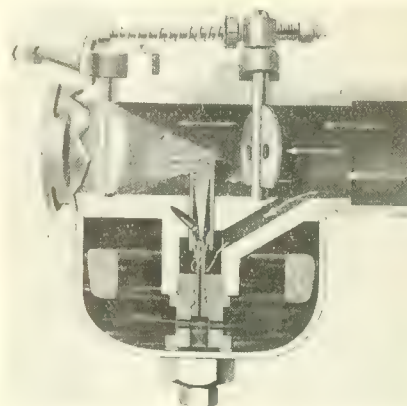
# Buyer's Department of The Commercial Vehicle



Kil-Nock Bearing Adjusters



Speederator



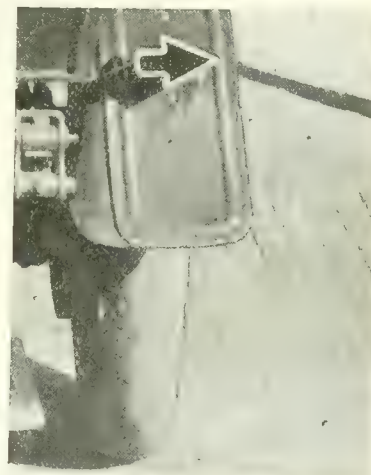
Thermo Carburetor



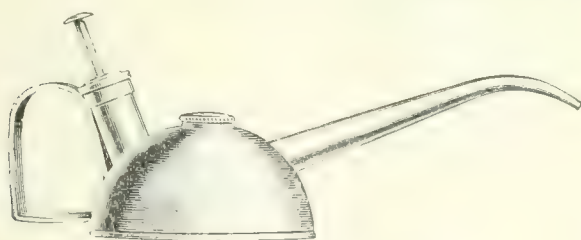
Ford Carburetor Control



Universal Piston Ring



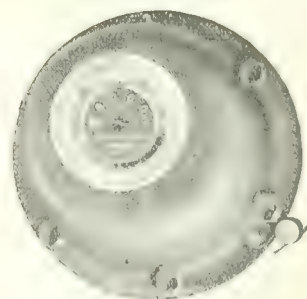
Aro Stop Indicator



Cannon Pump Oiler



Critz Pressure Lubricator



Veeder Hub Odometer

# Buyer's Department of The Commercial Vehicle

## E. & S. Power Hack Saw

THIS saw is small enough to mount on a bench and has been especially designed for shop service. The vital point is the rigid construction of the saw arm which is guided by accurately machined dove tail bearings adjustable for wear. The crank works in a slot in a hardened steel roller, eliminating the usual connecting rod. A weight regulates the exact pressure on the saw blade to secure proper cutting results.

When the saw blade has cut through the work an automatic release throws off the clutch and stops the saw. Specifications include a 10-in. diameter pulley with a 2-in. face, a speed of 100 r.p.m., and a weight of 60 lbs. The manufacturer is the Manley Mfg. Co., York, Pa.

## Stevens Piston Aligners

UNLESS each piston works exactly straight up and down in its cylinder, the overhauled engine is headed for sure trouble. The piston will not touch evenly—it will bind and score—the best rings will refuse compression. This can be prevented by aligning each piston accurately. The Stevens piston aligners for Ford and other truck engines also test-fit bearings.

There are two highly finished surfaces (1) and (2). On the surface (1) the mechanic aligns the piston and connecting rod; on (2) he trues up the wristpin. On the arbor (3) is done the preliminary test-fitting of connecting rod bearings. This makes easy bench work, instead of the old method of getting under the truck. The Universal model with arbor sells for \$24. Extra arbors cost \$5. The Ford model with special arbor sells for \$10. The combined arbor and reamer sells for \$6.50. The maker is Stevens & Co., New York City.

## Dover Radiator Filler

THIS has been designed for fleet owners and has a 3-gal. capacity with a 1½-in. diameter end of spout. The maker is the Dover Stamping & Mfg. Co., Cambridge, Mass.

## Gilfillan Portable Drill

THIS drill has a ½-in. capacity and a non-stallable universal motor. It may be operated from any ordinary electric light circuit. Equipment includes a Jacobs chuck and 12½ ft. of heavy insulated extension cord. The switch is located in a special switch box independent of the handles and may be operated without releasing hold on the grip handle.

The STU model shown herewith has a voltage of 110 and an r.p.m. of 380. The price is \$100. The 220 volt type

## Shop Equipment for Fleet Owners

costs \$102. The maker is the Gilfillan Bros. Smelting & Refining Co., Los Angeles, Cal.

## Gem Creeper

A LOCKING device is a feature of this creeper. By pulling up on a lever the creeper is elevated on four lugs so that no casters touch the floor. The head rest can also be elevated. The creeper is made of steel and the casters are mounted in ball bearings. Prices range from \$5 to \$9.50, according to size. The maker is the J. Broome Mfg. Co., 1016 West 39th Street, Los Angeles, Cal.

## All-In-One Wrench

THIS is a time and labor saving tool and will reach parts inaccessible. By simply pressing the button on the head of the wrench it may be set at any angle required. The ratchet is positive in action and cannot reverse itself. A turn of the knurled ring to the right works the ratchet to the right, a turn to the left and it works to the left.

The wrench complete includes six sockets with the following sizes, 7/16, 8/16, 9/16, 10/16, 11/16 and 12/16. The price is \$7. An adapter to take care of other makes of socket with a square shank is included in the set. The maker is the All-In-One Wrench Co., Chicago.

## B & D Portable Electric Grinder

THE Black & Decker Mfg. Co. has perfected a portable electric grinder with the pistol grip and trigger switch control. This product is supplied complete with a quick detachable base and adjustable tool rest so that it can be used with equal facility as a bench grinder. Besides the base the equipment also includes two 5 by 1-in. grinding wheels, one fine and one coarse, a wire brush wheel and a rag buffing wheel.

In addition to the grinding, cleaning, buffing or polishing jobs that can be accomplished with this machine around the shop, it can also be used as a power unit for testing generators, magnetos, distributors, etc., by mounting the pulley on the grinding shaft.

Grease lubrication is used throughout. Other features include forced air cooling, chrome nickel steel gears and shafts and an aluminum alloy housing. The entire mechanism is protected from dust and other foreign matter. The net

weight without the base is 21 lb. These grinders operate on either direct or alternating current.

## Rear Axle Sleeve Puller

THE Rysco rear axle sleeve puller is designed for removing the roller bearing sleeve in the Ford rear axle housing. Its weight is 6 lb. The price is \$5.25. The maker is the Railway Specialty Co., Atchison, Kansas.

## Spencer-Smith Semi-Steel Pistons

THESE pistons are made for most of the better known trucks. Each piston is wrapped individually in oil paper and a complete set is packed in a box. Pistons for Ford trucks and delivery cars are equipped with rings and pins. Standard and all oversized pistons up to .062 are also manufactured. These pistons are machined from semi-steel castings and are said to be as light as is consistent with strength. The maker is the Spencer-Smith Machine Co., Howell, Mich.

## Chain Drill

THE Goodell-Pratt chain drill is made with hand feed and two different styles of automatic feeds. The adjustable automatic feed saves time and breakage of drills. The amount of feed is governed by a knurled nut on the front of the frame. This nut is marked with different drill sizes, which are turned to come opposite a fair mark on the frame. The hand feed is preferred by some, as they can absolutely control the pressure upon the drill at all times.

On all styles of Goodell-Pratt chain drills the squared end of the steel spindle is case hardened to prevent its being damaged. The spindle runs in ball bearings which reduce the end thrust. Each drill is equipped with 3 ft. of strong steel chain.

The maker is the Goodell-Pratt Co., Greenfield, Mass.

## Rysco Engine Stand

THIS stand for Ford engines can be adjusted to any angle and clamped to the stand at any position from perpendicular to horizontal to suit the requirements of the mechanics while performing the different operations in repairing the engine block.

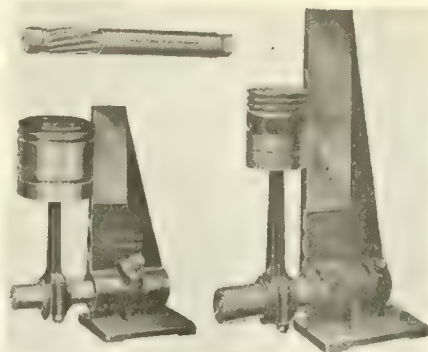
The engine block is held in position by bolting through holes in arms of stand, spaced to fit the holes in the cylinder. The height is 33 in. and the floor space occupied is 15 by 16 in. The weight is 75 lb. The price is \$20 and the maker is the Railway Specialty Co., Atchison, Kan.



# Buyer's Department of The Commercial Vehicle



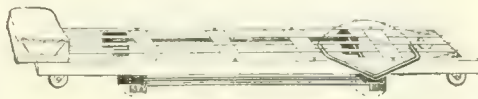
*Rysco engine stand*



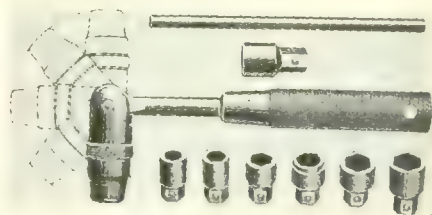
*Stevens piston aligners*



*Dover radiator filler*



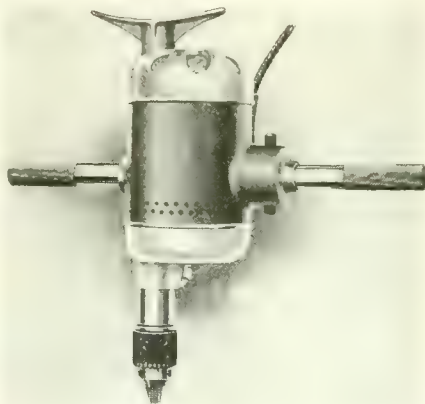
*Gem creeper*



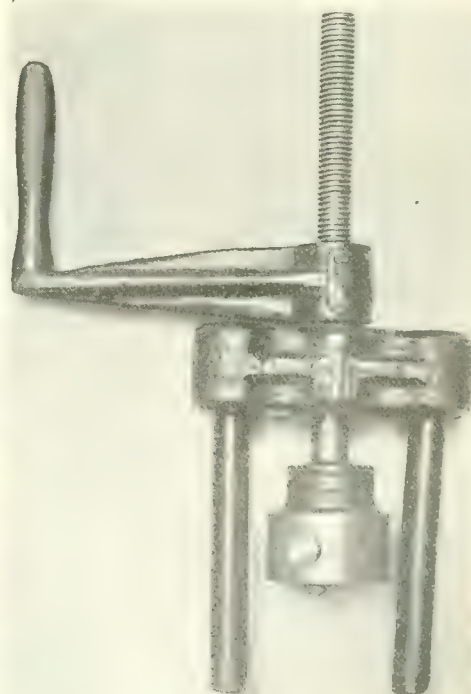
*All-in-One wrench*



*Chain drill*



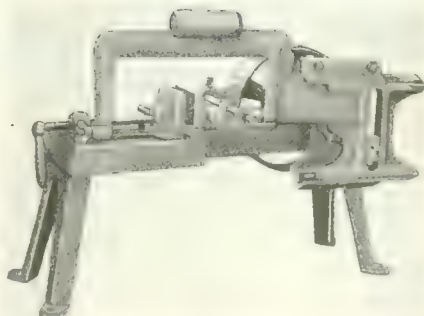
*Gilfillan portable drill*



*Rear axle sleeve puller*



*B & D portable electric grinder*



*E & S power hack saw*

## Buyer's Department of The Commercial Vehicle

### Demountable Bodies Save Money

**Wholesale Grocers Cut Time of  
Loading and Unloading 1½-  
Ton Trucks from 1 Hr.  
to 12 Min.**

BY the use of demountable bodies, the William Cluff Co., wholesale grocers, Oakland, Cal., makes two trucks do the work that would ordinarily require four trucks. Loading or unloading, instead of holding the truck idle for approximately 1 hour, delays the truck only 12 minutes, 6 minutes for removing the old body and 6 minutes to attach the new one.

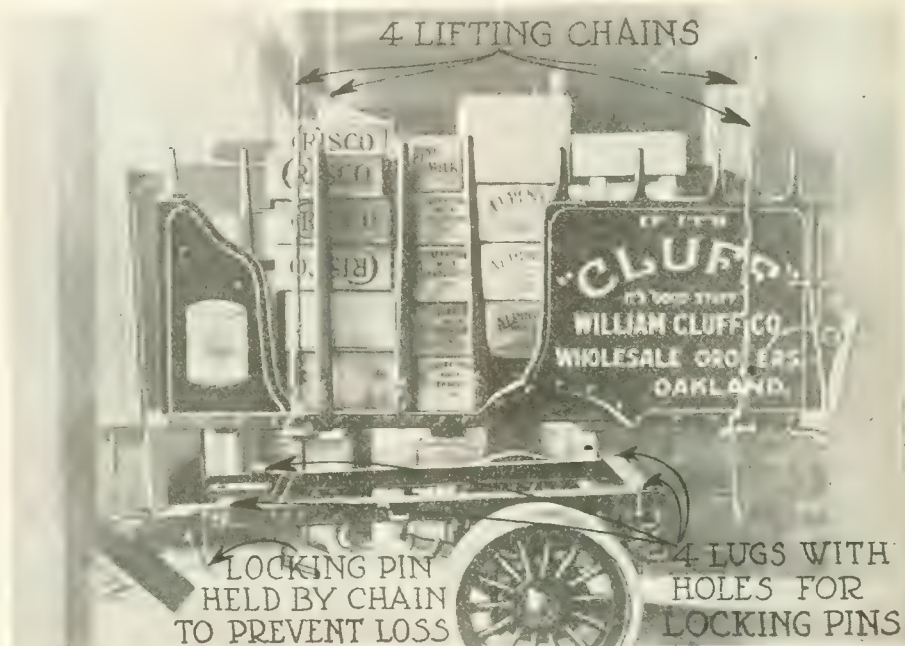
The trucks are used for picking up and delivering goods so that sometimes they go out empty to bring in a load of goods and then again they are sent out full to make a trip among the retailers.

When a truck comes in it is run under an overhead traveling crane which is hand operated. The crane runs the full length of a 150-foot bay, so that when it lifts off the body it is moved to whatever part of the bay this load should go to. The body is deposited there and unloaded at leisure. As soon as this body is placed the crane picks up another body, carries it to the truck chassis and the body is lowered in position.

The crane is a Cyclops of 3-ton capacity. It lifts the body by four cables, two on each side. These cables connect with rings on the sides of the body so that attaching or removing the cables is just the work of a moment. Simple lugs on the chassis frame register with similar lugs on the underside of the body so that when the body is in place it cannot shift, either sideways or fore and aft. Four heavy cotter keys lock the body tightly to the chassis. These keys are secured by small lengths of chain so that they will not be mislaid or lost while bodies are being changed.

There is no difficulty in placing the body on the chassis. The fact that the body hangs from four cables makes it possible to push it lightly to one side or the other or fore and aft. Also, it is a simple matter to back the chassis in so that it will be in correct position in a fore-and-aft direction while later all adjustment is readily obtained by rolling the crane along its rails.

Since the crane travels 150 feet, it greatly simplifies loading and unloading of the bodies for it is possible to place the body at the most convenient point for this work. If part of the goods loaded or unloaded is wanted at a certain point



Closeup view of the body, showing method of placing body on chassis. The overhead traveling crane is hand operated



View of the loading bay, showing bodies waiting to be loaded. One already loaded is being placed on a truck which has just come in

and the rest of the goods at another point it is a simple matter to place the body at the nearest convenient point for the one part of the work, and then pick it up and carry it to the most convenient point for the remainder of the work.

Each truck makes from four to five trips per day and the average mileage per trip is 10. In other words a round

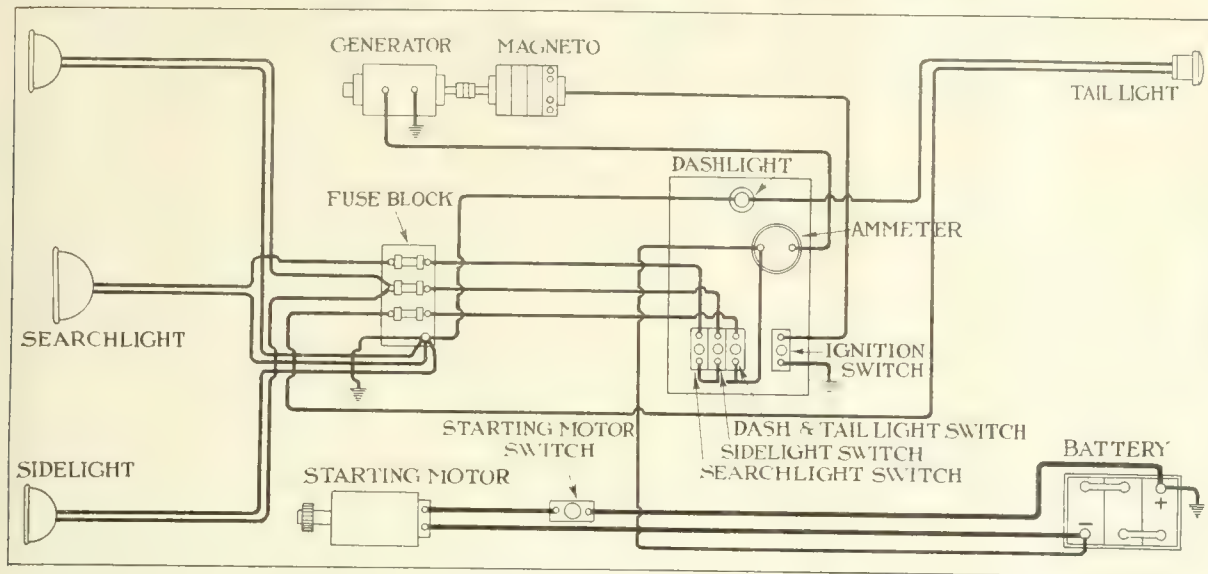
trip is made in 2 hours or a little less, including the 12 minutes consumed in changing bodies.

It will be noted that there is little difference in the construction of these bodies in order to adapt them for the work. They cost \$500 each whereas the same bodies without demountable features would cost about \$400.



# Motor Truck Electric System Wiring Diagrams

## 30—Starting and Lighting Unit on Knox Tractors



*This shows the starting and lighting wiring diagram used on the Knox tractors, Models 35 and 36. Note that both these models use a searchlight.*

### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE:

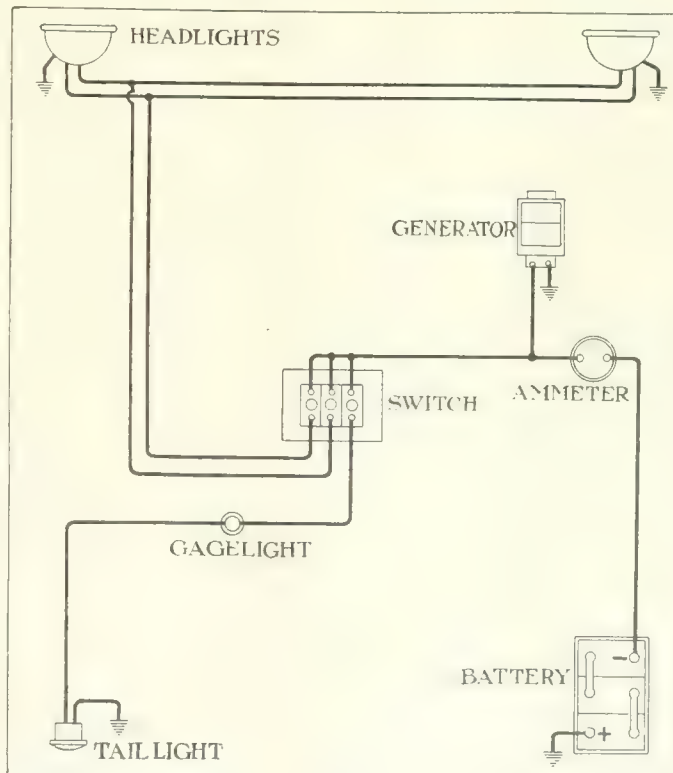
#### 1920

- 1—Ford, Starting and Lighting.....Oct. 1
- 2—Acme, Lighting.....Oct. 15
- 3—Bethlehem, Starting and Lighting.....Oct. 15
- 4—Atterbury, Lighting.....Nov. 1
- 5—Ace, Starting and Lighting.....Nov. 1
- 6—Atlas, Starting and Lighting.....Nov. 15
- 7—Briscoe, Starting and Lighting.....Nov. 15
- 8—Defiance, Starting and Lighting.....Dec. 1
- 9—Commerce, Starting and Lighting.....Dec. 1
- 10—Grant, Starting and Lighting.....Dec. 15
- 11—Brockway, Starting.....Dec. 15

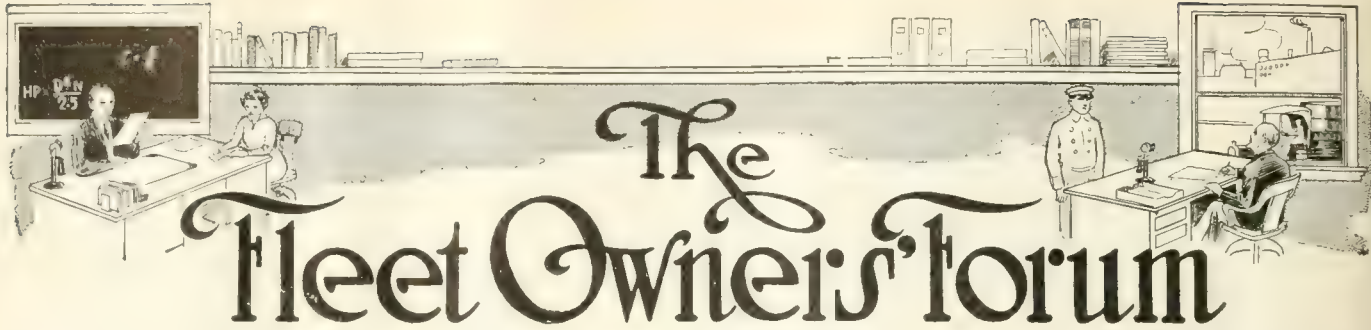
#### 1921

- 12—Maxwell, Lighting.....Jan. 15
- 13—International, Starting and Lighting.....Feb. 1
- 14—Mack, Starting and Lighting.....Feb. 15
- 15—Vim, Starting and Lighting.....Mar. 1
- 16—Oldsmobile, Starting and Lighting.....Mar. 15
- 17—Reo, Starting and Lighting.....Apr. 1
- 18—Sterling, Starting and Lighting.....Apr. 15
- 19—Stewart, Starting and Lighting.....May 1
- 20—Kelly-Springfield, Starting and Lighting.....May 15
- 21—Fiker, Starting and Lighting.....May 15
- 22—U. S., Starting and Lighting.....June 1
- 23—Wilcox, Lighting.....June 1
- 24—Pierce-Arrow, Starting and Lighting.....June 15
- 25—Republic, Starting and Lighting.....June 15
- 26—Parker, Starting and Lighting.....July 1
- 27—Noble, Starting and Lighting.....July 1
- 28—Oneida, Starting and Lighting.....July 15
- 29—Oshkosh, Starting and Lighting.....July 15
- 30—Knox, Starting and Lighting.....Aug. 1
- 31—Master, Lighting.....Aug. 1
- 32—Watson, Starting and Lighting.....Next Issue
- 33—Service, Lighting.....Next Issue

## 31—Lighting Unit on Master Trucks



*Electric wiring diagram as used on the 1½, 2½, 3½ and 5-ton Master truck models. This diagram is used with the Vesta system.*



# The Fleet Owners' Forum

## How to Remove Engine Scale to Prevent Overheating

To the Editor, COMMERCIAL VEHICLE:

What is the best way in which to remove engine scale? My engine has been overheating of late and I believe it is due to the accumulations of impurities in the water on the inner walls of the cooling system. R. MORRIS, Koppers Coke Co., Pittsburg, Pa.

Accumulations of lime, iron or other impurities in the water which are deposited on the inner walls of the cooling system may be removed by means of a solution of hydrochloric (muriatic) acid, or caustic soda.

The cooling system should be thoroughly drained and flushed with water several times. Both the upper and lower water joints should be removed and the lower pump connection plugged up. After this has been done the third step is to mix a solution consisting of one part of hydrochloric acid of a specific gravity of 1.20 and three parts of water, by volume. This solution should be poured into the engine cooling system, through the upper water connection, until this part of the cooling system is quite full. The solution should be left in the system until the scale becomes loosened. The solution may be made a little stronger at the last, in order to soak through any thicker portions of the scale. Some of the scale will be visible and tangible in the upper water connection pipe and this can be tested from time to time, to ascertain whether the loosening process is complete. It should be pointed out here that this solution should not be used in radiators, because it will attack any impurities in the copper and result in leaks in the radiator and a general weakening of the latter.

After the scale is loosened, the plug in the lower pump connection can be removed and the scale and solution allowed to flow out through the lower pump connection. The water jacket should be flushed with pure water at a fairly high pressure, by inserting a hose into the upper pump connection. This flushing process should be continued for some time in order to clear out the last of the scale and especially the solution. It is particularly necessary that the acid be thoroughly removed to avoid electrolytic action between the iron of the cylinder walls and brass or aluminum parts.

Before the solution is poured into the cooling system, care should be taken to insure that the system is thoroughly drained, because any water which re-

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

mains in it will dilute the solution and lessen its effect upon the scale.

Instead of hydrochloric acid, caustic soda may be used with the same result. Caustic soda is slightly less effective in removing the scale, but it has one advantage over hydrochloric acid. Unless the latter is thoroughly cleaned out of the cooling system, it will gradually eat away any brass there may be in the pump. The use of caustic soda avoids this danger. The caustic soda breaks up the hard deposit of scale into a powder or sludge which can subsequently be re-

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

moved by a thorough flushing out of the pipes with water. This action only takes place, however, if the strength of the solution of caustic soda lies between 15 per cent and 22 per cent.

The solution is made in the correct proportion by dissolving 2½ lbs. of solid caustic soda so that it makes 1 gallon of solution; 5 lbs. so that it makes 2 gals., etc. The solution should be allowed to remain in the cooling system all night and run off in the morning.

Caustic soda will corrode aluminum and should not be used if the cooling system has an aluminum pump cover.

## Solving Driver Question Through Profit Sharing Plan

To the Editor, COMMERCIAL VEHICLE:

Do you know of any trucking concern whose drivers are given the opportunity of owning their own trucks through some profit sharing plan? It seems to me that it would be possible to work out some such scheme and if successful it would certainly solve the driver problem. By that I mean, the driver would be given an incentive to perform his work

in an efficient manner. This applies especially to the contractor's field and public cartage.—N. O'NEIL, Wilmington, Del.

The United Cartage & Transfer Co., Detroit, appears to have solved the driver problem along the lines outlined in your inquiry. By its system a thrifty driver may make a good wage and at the same time become owner of his truck after a period of months ranging from 12 to 18.

When a driver seeks employment with the company his record is investigated thoroughly no matter under which plan he elects to work. He can work for wages, if he owns his own truck he can work on a percentage basis, or if he desires to buy his truck on the percentage plan he has that privilege.

There is no hard and fast rule as to the amount of the percentage to be exacted. That is determined by the work in hand. There is a 10 per cent allowance on all contracts for overhead, that is, office expenses, bookkeeping, collecting, etc. The driver operating under the percentage plan may secure a contract for himself, and if he so elects he may retain all of the money from that contract, but in so doing he must take care of his own bookkeeping and collection and settle all disputes that may arise. If he prefers to handle it through the company office he is relieved of all responsibility for the 10 per cent.

Few drivers avail themselves of the opportunity for handling their own accounts. A big factor, of course, is the delay in payment on contracts, and few drivers care to handle them personally and wait maybe 30 days and perhaps longer for payment. With the company handling the contract the driver can avail himself at all times of a drawing account up to any amount that is due on the contract. This applies to contracts that are secured by the driver himself, as well as those that come to him through the company's office.

As to the purchase plan, the rule for a down payment of 20 per cent is required, the balance to be paid in monthly installments distributed over a period dependent on the price of the truck.

A 100 per cent productive effort is assured to the company from its drivers, not only those who are operating under the percentage or ownership plan, but the wage drivers as well, because they have in mind at all times the ownership plan.



## Wants Data on Scientific Truck Loading

To the Editor, COMMERCIAL VEHICLE:

We would like to have some data on scientific truck loading. We do not mean from the standpoint of handling automatically, or equipment to load the truck rapidly, but rather the distribution of the load on the truck body in order to avoid sidesway, slipping, skidding, undue wear on the tires, and undue depreciation from vibration, resulting from improper distribution of the weight of the load.

The writer understands that, prior to the war, quite a study of this subject was made in Germany. In fact, I had some data from German sources in hand several years ago, but this has been mislaid and I am very desirous of obtaining anything you may have on the subject at this time.—H. W. DUDLEY, Chicago.

As far as we know, no scientific study of this subject has ever been made in this country. The subject has only been studied in certain lines of business in connection with certain types of loading and then only in connection with loads peculiarly liable to shift in the truck body.

An example of this is the arrangement for interior of tank bodies used in the transportation of gasoline, light oil, etc., in bulk.

The most interesting article we have seen on this subject was published by the Packard company in the Packard Freight Transportation Digest, Vol. 3, No. 15.

On the whole, however, the question of loading the usual commodities hauled by trucks, such as furniture, parcels, sand, gravel, coal, bricks and similar dry material does not involve very much study as regards load distribution. It is naturally more economical to carry as nearly as possible a full load and when the body is filled and tightly packed the weight will be very nearly evenly distributed and will not shift.

In other cases where it is necessary to transport one or two heavy articles without a full load, drivers are instructed to place these goods, such as refrigerators, in the center of the body at the front and rope them in place.

A study has been made of the varying stresses developed by certain truck speeds and truck loads. An article on this subject was published in the March 15, 1921, issue of THE COMMERCIAL VEHICLE. This does not apply to load distribution in the truck body, but may be of interest to you.

## Unit Costs of Motor Truck Deliveries

To the Editor, COMMERCIAL VEHICLE:

Will you please give us the unit cost of delivering sand, brick, coal and bread by motor trucks, giving the cost for sand and coal on the ton-mile basis; the cost of brick delivery per thousand and the cost of bread delivery per load?—G. BATES, Summit, N. J.

Not knowing the conditions under which trucks in your territory operate, the best information which we can give you is to cite the cost of delivering the

four products mentioned in certain specific instances. These cost figures hold good only for the installation cited and cannot be used as a guide to what the work would cost in other installations where the operating conditions are different.

For example, one large coal dealer in New York City, operating a fleet of twenty-two trucks, has found that it cost him 65 cents per ton to deliver coal in 5-ton truck averaging approximately 40 miles a day. These trucks deliver both to plants in 5-ton loads and to householders in partial loads of from 1 up to 5 tons. The average length of haul in this case is approximately 8 miles. Under the severe traffic difficulties last

## Inter-Plant Haulage

KEEPING track of trucks that are used in inter-plant haulage is an absolute necessity when economy in operation is desired.

The Studebaker gate pass shown on this page is one way of solving the problem.

This pass is carried by the driver and is presented to the watchman at the gate when entering or leaving and punched by him to indicate the time.

winter under which trucks were forced to work, due to snow storms, the cost per ton delivered in this one installation was increased to \$1 a ton. As a result of this the coal dealers decided to make an extra charge for the delivery of coal under stormy conditions.

In the same manner bread delivery costs vary from 1½ to 2 cents per pound load when delivered from local bakeries within a radius of 10 miles. When this bread is delivered within a radius of 6 miles by electric truck the cost is nearer 1 cent a loaf. When it is delivered with gasoline trucks beyond the 10-mile radius the cost exceeds 2 cents per loaf. In this work 2-ton trucks are used, each carrying 1000 loaves of bread.

In regard to the delivery cost of sand, one prominent sand company in New York City charges \$1.90 per cubic yard for hauling sand in 5-ton trucks. The hauls in this case do not average over 8 miles to the trip. In the case cited the sand is loaded into the trucks at the wharf by means of steam cranes. A 20 per cent reduction of delivery cost is made when it is possible to load the sand by gravity directly into the trucks from overhead hoppers.

Normally bricks are delivered at the rate of \$1.50 per thousand on hauls not exceeding 8 miles per round trip. In any given city you will find that a fixed price is generally given for delivery to all sections, any varying incidental cost being made up by extremely short deliveries. But even this cost is subject to variation and during the snowstorms last winter New York City concerns delivering bricks on 5-ton trucks charged as high as \$3 per thousand.

## What to Consider in Long Distance Furniture Moving

To the Editor, COMMERCIAL VEHICLE:

I am contemplating entering the long-distance haulage field, and will specialize on furniture. I believe that it is possible to make profits in this line, providing, of course a truck owner goes into the game with his eyes open. Have you at any time ever published an article dealing with the subject of long-distance hauling, and if so, in what issue did it appear?—A. WILLIAMS, Cleveland.

Overland haulage of household goods must be studied from an entirely different angle than that necessary in short-haul work. When it is considered that overland haulage means that the trucks are away from headquarters from 7 to 10 days at a time, it is manifest that making a profit from such long trips requires keen study.

A good example of how one furniture mover has made overland haulage of household goods profitable may be cited in the experience of the H. C. Lee & Sons Co., Toledo. This story appeared in the Aug. 15, 1920, issue of THE COMMERCIAL VEHICLE.

"Pointers on Overland Truck Haulage" is an article that appeared in the Sept. 1, 1920, issue. This story covers the fleet of trucks owned by the Central New York Motor Transport Lines Inc. Its trucks are operated upon two principles, which so far have been closely adhered to. First, that shipping by truck is very satisfactory and economical over distances up to 100 miles. Beyond that it is a luxury, and not economical. Second, that all trucks should make a round trip each day and be home at night, so that both truck and load can be accounted for the same day. For distances of 35 miles or less, that company has

STUDEBAKER GATE PASS	
Dept. _____	Date _____
Name _____	Roll No. _____
<b>A. M.</b>	
<b>IN</b>	<b>OUT</b>
12	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9
9	10
10	11
11	12
<b>P. M.</b>	
<b>IN</b>	<b>OUT</b>
12	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9
9	10
10	11
11	12

The Studebaker company keeps track of its trucks at the Detroit factory by this gate pass



used solid-tired trucks, geared to travel about 15 m.p.h. For distances above that pneumatic-tired trucks, geared to travel 25 m.p.h. are used. The 1½-ton and 2½-ton sizes have been found most satisfactory.

### General Rules in Regard to Painting of Trucks

To the Editor, COMMERCIAL VEHICLE:

I would appreciate any information that you may have on the painting of trucks. I have come to the conclusion that a good coat of paint is one of the cheapest kinds of insurance policies against a short truck life and as a result will welcome any practical hints.—M. MEYERS, Brooklyn, N. Y.

An article covering your question appeared in the Nov. 15, 1920, issue of THE COMMERCIAL VEHICLE.

### Wants Material for Book of Instruction

To the Editor, COMMERCIAL VEHICLE:

We are planning to publish a monthly pamphlet which will be used in our delivery department, a copy of the pamphlet going to each driver for the purpose of instructing him in house policies. We are also planning to incorporate in this pamphlet all helpful hints that will benefit the drivers. Have you published any articles that will aid us in our work and do you know of any fleet owners that use this method of instructing the drivers?—H. SWOPE, St. Louis, Mo.

THE COMMERCIAL VEHICLE has, from time to time, published special articles that apply to the driver question. These stories have been based on the experiences of fleet owners throughout the country and in most cases the ideas back of them having gained results as far as obtaining efficiency from the drivers is concerned.

The method used by the New York Telephone Co. for educating its drivers is one that will be of interest to you, so far as making up a pamphlet is concerned. This company issues bulletins to its drivers at stated periods. These bulletins are kept in a loose-leaf binder, small enough to be kept in the driver's pocket. The cost of the binder is 30 cents. It is 4¼ in. wide and 7½ in. long. You will find a complete description of this plan in the March 1, 1920, issue, pages 76 and 77.

Taking the New York Telephone Co.'s idea as a foundation for your plan, the following list of articles dealing on driver efficiency, etc., should be of assistance to you in reference to incorporating helpful hints for greater efficiency.

Oct. 15, 1920, pages 174 and 175, describes the method of Marshall Field & Co. for promoting co-operation with its drivers.

July 1, 1920, pages 350 and 351, is a story entitled, "How to Train Drivers to Avoid Accidents."

A list of articles dealing with bonus systems that have been used to reduce accidents appears on page 377 of the July 1, 1920, issue.

You may be interested in some hints to pass along to your truck drivers in regard to truck traction and how to get

it, as appeared in the June 15, 1920, issue, page 316.

"When I Talk with My Drivers" is the title of the story written by N. J. Smith, superintendent of garages for the Consumers Co., Chicago. Mr. Smith has obtained good results by talking to the drivers of the 102 large trucks owned by that company. This story appeared on pages 282 and 283 of the June 1, 1920, issue.

"How to Pick Drivers Who Will Stick" should be of interest to you. Refer to the March 15, 1920, issue, pages 110 and 111.

The Fifth Avenue Coach Co., operating over 280 buses, has saved money through a well-planned publicity campaign covering a series of fuel economy contests. Bonuses were given to the drivers who made the best fuel consumption records. According to the story, the company paid the drivers \$2,220 and the drivers saved the company \$9,000.

You should be interested in a story entitled "Incentives for Truck Drivers," published in the Feb. 15, 1920, issue on pages 50 and 51.

"The Duties of the Truck Driver" is the title of a series of stories which show how fleet owners can be sure that the drivers understand their trucks. These

### Educating Drivers

WHEN a fleet is so large that it is impossible to give the drivers personal attention as regards efficient operation of the trucks, a good plan is to convey the instructions through the medium of a pamphlet or house organ.

Read the letter on this page in regard to instruction books that have been used by prominent fleet owners.

### It Will Pay You

articles appeared in the Jan. 1, Feb. 1 and Feb. 15 issues. The series includes the driver's daily, weekly, bi-weekly and monthly duties.

### When to Lease or Own Trucks from Customer's Viewpoint

To the Editor, COMMERCIAL VEHICLE:

Have you at any time ever published an article on the question of when it is best to lease or own trucks in highway transportation?—L. SMITH, Detroit.

Your question is answered on page 82 of the March 1, 1920, issue of THE COMMERCIAL VEHICLE in an article entitled, "When to Lease, When to Own Trucks."

### What to Consider in Changing from Solids to Pneumatics

To the Editor, COMMERCIAL VEHICLE:

We are interested in the subject of changing from solid tires to giant pneumatics and would appreciate your giving us any information on just what should be considered in making such a change.

—READER.

Just what should be considered in changing from solid tires to giant pneumatics was discussed on page 89 of the March 1, 1920, issue of THE COMMERCIAL VEHICLE.

### Wants Plan for Selling Cars to Salesmen

To the Editor, COMMERCIAL VEHICLE:

We have a number of salesmen, both city and country, who travel in automobiles furnished by the company. We find the expense rather heavy and are considering the plan of each man owning his own car, being allowed a certain amount per month for same. Have you any information along this line and do you know of any concerns that are handling a like condition? What we would like to know is the basis of the allowance.—W. W. REW, manager of the Magnolia Petroleum Co., San Antonio, Texas.

There are practically two methods in vogue in supplying salesmen with cars. The first, and that most largely followed, is for the employer to buy the car outright and resell it to the salesman on a time payment basis, allowing a fixed amount monthly for operating expenses. This is paid by the salesman and the amount is credited to him on the purchase of the car.

The other plan is for the firm or employer to buy the car outright, supply the salesman and pay the operating expenses, just as they do all other expenses incurred by the salesman while traveling by rail or any other manner.

The Detroit City Gas Co. buys the car outright and resells to the salesman on the monthly installment plan, allowing salesman \$500 operating expenses.

The Loose-Wiles Co., manufacturing bakers, buy the cars outright and resell to the salesmen. They state the expense is about the same as railroad fare but they had an increase of business in a normal season of about 35 per cent.

The Omaha branch of the Cudahy Co. stands one-half of the purchase price and the other half is paid back by the salesman at the rate of \$25 a month. The salesman pays all expenses and is allowed \$30 a month for the upkeep.

### Your Driver or—Your Partner

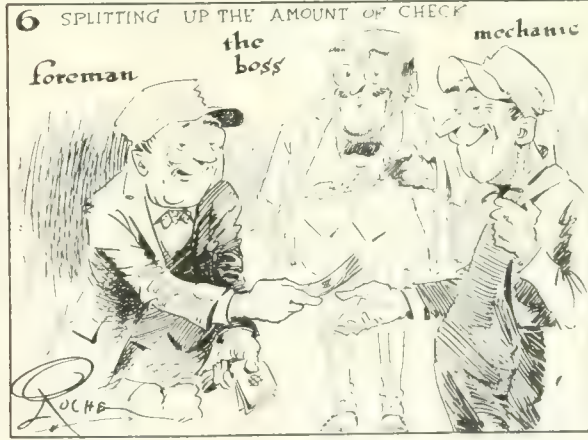
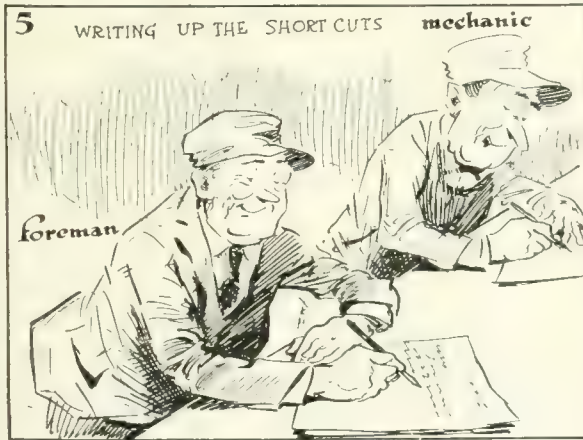
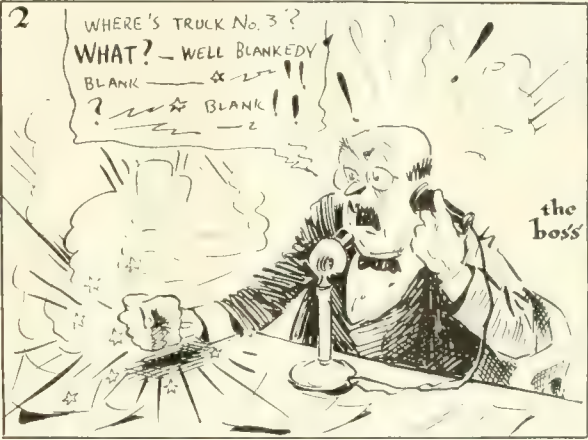
(Continued from page 11)

This system cuts down turnover to a minimum or eliminates it altogether. Both wage earners and drivers who are truck owners stay with the firm. The wage earners stay with the firm because they wish to take advantage of the plan and hope some day to own their own trucks. The men who own their own trucks do not secede from the company because they wish to have the overhead and collections handled for them and they realize that the plan under which these things are so handled is a fair one.

The system which has been copied to an extent by a number of the other cartage companies in Detroit has shown itself an excellent one. Of the many plans proposed and executed, looking to a profit sharing arrangement which would eliminate labor troubles and assure harmony and co-operation, that in use by the United Cartage Co. appears to have worked with greater success than any other.



# WHY NOT YOU?



*Send Us Your Ideas and We'll Send  
You Our Money. One Dollar for  
Each Sketch and Short Description*

THE COMMERCIAL VEHICLE  
239 West 39th St.  
New York City



## What Is Idle Time?

**T**HERE seems to be a good deal of difference of opinion among fleet owners as to the meaning of idle time.

First, there is a difference of opinion as to what is included in idle time and, second, there seems to be some doubt as to what part idle time plays in estimating truck costs.

First, what constitutes idle time?

The industrial plant definition of idle time is something like this. It is the time during which there is no work for a piece of machinery to do—or during which that piece of machinery is unfit to work.

Translating this in terms of a truck: Idle time would include only working hours or days when the truck is in the garage owing to a lack of work for it, or working hours or days during which the truck is unable to work—e. g., is undergoing repairs.

These two items are important and must be carefully considered and checked if the truck is to give its highest efficiency and largest possible return.

But there is another item, in addition to idle time, which should be carefully considered. For want of an accepted term this second item might be called unproductive time.

### Importance of Unproductive Time

There may be enough work for a truck to keep it busy every working day in the year. It may be so carefully driven—and so well looked after, after working hours—that it spends no *working* time in the garage at all, for repairs or for any other purpose. But that truck may still be working far below its maximum efficiency and may be actually losing money for its owner.

This loss of efficiency may be due to an excess of unproductive time.

There are two types of unproductive time which must be considered—which must be carefully watched and checked—if the truck is to attain its highest earning power.

The first of these might be called loafing time. That is, time in which the driver stops to talk to the housemaid, time in which the loaders stop for a brief political discussion or time in which the truck goes on a detour in order to give a lift to a friend of the driver.

The second might be called avoidable delays in

operation. This would include inefficient loading methods, the wrong type of body for the best loading and unloading, avoidable waits at terminals or freight yards, poor routing as regards avoiding congested districts, avoiding ferries where possible, avoiding poor roads where possible and finally an avoidable unloaded run to or from the loading platform.

On a careful consideration of every one of the above points—items which go to make up idle time and what is here called unproductive time—depends the efficiency and the earning power of the truck.

But if avoidable delays—for there may be avoidable delays under all three of these heads—are divided up under these three heads, there will be items of lost or wasted time which will be difficult to classify. For example, if a driver forgets to take a spare tire with him, gets a puncture and is laid up on the road for a while, is this idle time under the first head, or loafing time under the second.

### All Time Must Be Considered

Many other examples could be given. But in any case all these things must be considered. They must all be carefully checked if the trucks are to pay the profits they should pay or work as cheaply as they should work.

Now what part does idle time play in estimating truck costs?

Any one and all three kinds of idle or unproductive time *affect* truck costs. All three types are *present* in truck costs. But none need be considered in *estimating* what the truck costs actually are.

The actual costs are made up of definite charges against the truck and nothing else. You cannot make a concrete charge in dollars and cents for idle or unproductive time in estimating what the truck costs to operate, because idle and unproductive time are present in and a part of almost all the other cost items.

But idle time and unproductive time are and should be considered always in reducing these costs *when they have been estimated*.

So far as estimating costs is concerned, idle time and unproductive time are side issues. But they are issues the importance of which cannot be exaggerated.



## Big Increase in Bus and Freight Lines

### Californian Trucks Make Inroads on Railroad Earnings—700 Carriers

SAN FRANCISCO, CAL., July 24—Motor passenger and freight lines operating in California have more than quadrupled in the 3 years from 1917 to 1920, according to Henry G. Mathewson, secretary of the California State Railroad Commission, while to-day there are more than seven times as many such lines in this State as there were in 1917. Mr. Mathewson said:

"A few years ago the rural districts in California were entirely dependent on the railroad companies for transportation, and, therefore, the facilities were inadequate to the demand, and, even where rail transportation was available, the necessary tariff made it unprofitable. Today the transportation problem of the farmer, in the main as to feeder lines for the railroads, but also in main line transportation as well, has been largely solved by the motor truck. Co-operation, rather than rivalry, is necessary between these motor lines and the railroads, to insure the best results for both the shipper and the traveler and for the transportation companies, rail and motor.

"In 1917 there were approximately 100 passenger and freight lines of motor vehicles operating in California. The report for 1920 places the number at 425, but the number has increased until at the end of the fiscal year, June 30, 1921, there are not less than 700 authorized carriers of passengers, freight and baggage.

"The commission has received to date reports from 425 motor vehicle operating firms up to Dec. 31, 1920. These show that twenty of these firms had a gross annual revenue exceeding \$20,000 for 1920; sixteen exceeded \$30,000 a year; nine had more than \$40,000, and one company had a gross annual receipt of \$1,000,000 for the year. These firms operate from six to 135 motor vehicles."

The California State Railroad Commission, as well as the boards of supervisors of virtually every county in the State, is taking up the highway depreciation which has resulted from the operation of motor trucks and motor omnibuses and stages. The result of this will be the fixing of the percentage to which this industry shall share in the expense of highway maintenance throughout the State. The State commission is co-operating with the Federal bureau of highways. California, as a State, recently attempted to legislate on the liability of automotive vehicles along these lines. but the measure was opposed by the State Automobile Dealers' Association, and failed.

### Price Reductions

KALAMAZOO, MICH., July 21—A general price reduction ranging from \$300

on the lighter models to \$425 on the heavier trucks has been made by the Kalamazoo Motors Corp., maker of the Kalamazoo truck. The new prices, f.o.b. this city, range from \$2,495 for the 1½-ton truck to \$4,800 for the Road Builder's special 5-tonner.

SIOUX CITY, IOWA, July 15—Prices on Hawkeye trucks have been reduced from \$265 to \$645. The 1½-tonner is cut from \$2,365 to \$1,850; the 2-ton, from \$2,915 to \$2,650; and the 3½-ton, \$4,345 to \$3,700.

HENDERSON, N. C., July 16—The Corbitt Motor Truck Co. has reduced prices on all models from \$200 to \$500. Prices on the 1-ton are from \$2,400 to \$2,200; the 1½-ton, \$2,800 to \$2,600; the 2-ton, \$3,500 to \$3,150; the 2½-ton, \$3,650 to \$3,300; 3½-ton, \$4,500 to \$4,100; and 5-ton, \$5,500 to \$5,000.

BINGHAMTON, N. Y., July 25—The Larrabee-Deyo Motor Truck Co. announces reductions of \$200 and \$300 on its models. The 2½-tonner is cut from \$3,400 to \$3,200, the 3½-tonner from \$4,200 to \$4,000, and the 5-tonner from \$5,100 to \$4,800.

### Gasoline Prices

NEW ORLEANS, LA., July 15—Standard Oil prices have been reduced 1 cent to 19½ cents for gasoline and 12 cents for kerosene. Six months ago gasoline sold for 28½ cents and kerosene for 20 cents.

DENVER, COLO., July 16—Gasoline prices have again been cut, reductions of 2 cents a gallon going into effect in Colorado, Wyoming and Montana. Colorado, therefore, now sells its gas at 22 cents a gallon; Wyoming at 19 cents and Montana at 24½ cents. Kerosene has been cut 1 cent a gallon; in Colorado to 14 cents; Wyoming to 11½ cents and in Montana it has been reduced to 15½ cents a gallon.

### Dry Gas from Charcoal

NEW ORLEANS, LA., July 18—How motor trucks, driven by a dry gas obtained from charcoal, solve the transportation problems of the Soudan Cotton, Fuel & Industrial Development Co., a British syndicate, is the interesting story told by G. B. Middleton, of Cairo, Egypt, chief engineer of the company who passed through New Orleans recently.

The timber is converted into charcoal and thence into dry gas. It is stated that some of the trucks produce charcoal as they are driven along. This wood gas can be produced very cheaply for about one-sixth the cost of gasoline, it is stated.

### Freight Company Petitioned

PHILADELPHIA, July 14—A petition in bankruptcy has been filed against the American Motor Freight Corp., 134-154 North Twenty-second Street, Philadelphia, intercity freight forwarder.

The corporation, which until recently operated some fifteen trucks, has closed its doors and levies by constables already have been made.

## Serious Situation in Illinois

### State Officials Are Organizing to Keep Heavy Trucks Off New Highways

SPRINGFIELD, ILL., July 25—Owners of motor trucks are face to face with a serious situation in relation to the usage of the new concrete highways. The State and county commissioners, it is stated, are organizing to keep the heavier trucks off the roads, claiming that unusual damage results. The antagonism of the authorities toward large capacity motor vehicles creates a condition that promises to seriously affect the owners.

The point is raised that the truck owner did not help pay for the hard road and, therefore, he is in a position to be barred if his vehicle is responsible for abnormal wear and tear. Either the truck owner must agree to pay toll for the use of the roads—the money derived to apply on the upkeep—or he must substitute lighter trucks.

### Arm Trucks to Frustrate Hold-up Men

PHILADELPHIA, July 16—Hand-grenades are now being carried, in addition to rifles and pistols, by drivers of intercity truck concerns operating merchandise-carrying vehicles out of this city. Upward of three-quarters of a million dollars has been stolen in merchandise along the Lincoln Highway in six weeks from trucks operating over it. Each truck convoy has a "convoy master."

### May Widen State Highways

HARRISBURG, PA., July 16—Preliminary studies of projects for increasing the width of main State highways entering the larger cities of Pennsylvania so that they may be ultimately extended to 100 or 120 ft., are under way by State Highway Department engineers. The rapid increase in motor traffic has made it imperative to create future building lines. Studies nearest Philadelphia have been in Delaware, Bucks and Montgomery counties and in the Main Line district.

### Want Lower Fuel Prices

BUFFALO, July 25—The district attorney of Erie county and the corporation counsel of Buffalo have declared they propose to take retaliatory action against the Standard Oil Co., which they accuse of "maintaining a high price for gasoline in the face of declining prices for crude oil." The officials assert that the company's 700 filling tanks and pumps are in the streets contrary to law and that their removal will be ordered. It is contended that a reduction of 5 cents a gallon in the wholesale price is not in proportion to the decline of \$4 a barrel in the price of crude oil.



## Ramps in Six-Story Oakland Building

### Modern Structure Especially Designed to Expedite Truck Loading

OAKLAND, CAL., July 25—Plans now in the hands of the officials of the Parr Terminal Co., Oakland, for a six-story factory loft building on the Oakland waterfront, to cost \$250,000, are of especial interest to owners and operators of motor truck lines, as well as to warehouse and distribution interests all up and down the coast, since these buildings will embrace the latest equipment for the use and advantage of motor trucks, as well as the most modern plans of warehousing, factory "apartments" and distribution. Ramps as well as elevator service will handle motor trucks to every floor and every department of the factory loft building, which will have a floor space of 20,875 ft. All facilities, such as heat, light, cooled air, telephones, and elevators, will be installed and furnished at nominal cost to the occupants. This has not been done before on the Pacific Coast, according to Fred D. Parr, president of the company.

The building will be constructed of reinforced concrete, with metal sash, each wing being 73 ft. wide, assuring sufficient light for any industry. A central traffic bureau will be installed for the use of all the occupants. The entire ground floor of the building will be occupied by a central shipping, receiving and warehousing department, operated by the management of the building for the convenience of tenants. Raw materials will be received and delivered to occupants on the floors above as needed, and finished products will be stored, to be shipped by water, rail, motor truck or airplane, as desired.

Motor truck, water and rail lines run to the doors of the new building, and the motor truck lines are continued inside by means of elevators and ramps, thus eliminating loss of valuable time and labor, and also, through the central shipping department, doing away with handling charges for raw and finished products to a great extent. Savings afforded by these features alone indicate that the building will meet with prompt rental.

### New Cutler Radiator

CAMDEN, N. J., July 22—The Cutler radiator for trucks is a new product of the Cutler Auto Radiator Co., Inc., this city, which has been incorporated with capital stock of \$125,000. The new device has a quickly removable, interchangeable and floating cooling unit for all types of automotive vehicles. It has a shock-absorbing radiator shell. It is claimed that this radiator will prevent the removal from service of any truck for a greater period than 15 minutes, so far as radiator adjustments are concerned. It is not necessary to change the design of any truck in order to adapt

the radiator. While it is now necessary to remove numerous nuts from some makes of trucks before the radiator core can be taken out, it is claimed by this concern that only four bolts have to be removed in order to take out the radiator core when the Cutler radiator is in use.

### Panther Has 6-Speed Gearset

CLEVELAND, July 18—The first of the new Panther motor trucks, built by the Fremont Motors Corporation, Fremont, Ohio, is being exhibited in this city. The new double direct-speed axle is the outstanding feature of the vehicle. The two ratios give six speeds forward and two reverse. In the power range the ratios are: 5 to 1 (direct) on high; 12 to 1 in intermediate, and 24 to 1 in low. In the speed range they are: 8 to 1 (direct) on high; 18 to 1 in intermediate, and 37 to 1 in low.

The capacity of this model is from 1000 to 4000 lb. Because of the higher speed available, the 1000-lb. load, it is stated, can be carried as economically as the maximum load.

### Atlas Truck for Trackless Cars

YORK, July 18—The Atlas Truck Corporation, this city, which makes the Atlas truck, has been awarded the contract for eight trackless trolley buses for the City of New York, to be used on Staten Island.

This bus resembles very closely the one-man prepayment car, and has the same seating capacity.

### Sherman Leaves Class Journal Co.

NEW YORK CITY, July 24—Ray W. Sherman, executive editor of the Class Journal Co., has resigned to become merchandising director of the Automotive Equipment Association.

Before becoming executive editor of the Class Journal papers Mr. Sherman was editor of *Motor World*, which he joined more than nine years ago. Previously he had spent several years in daily newspaper work and for a time was in the advertising department of the Franklin Automobile Co. He was graduated from Syracuse University in 1907.

The work which Mr. Sherman will undertake, with a staff of assistants, is virtually an educational campaign intended to carry a practical message of better merchandising to all branches of the automotive equipment trade.

## Coming Events

1921

September, 1921—Sacramento, Cal. Seventh annual truck show during State Fair, State Agricultural Society, Sacramento.  
Sept. 9-17, Ottawa, Ont., Motor Truck Show, Howick Hall.  
Sept. 28-30, New York City, Electrical Show, 71st Regiment Armory.  
Sept. 2 weeks, Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.  
October 12-14, Chicago, Annual Convention of the National Implement and Vehicle Assn., H. J. Sanford, Sec'y., 72 West Adams St.

## L. C. L. Freight Hauled by Tractor-Trailer

### System Operates Between the Freight Houses of Railways in St. Louis

ST. LOUIS, Mo., July 26—Transfer of less-than-carload freight by means of a tractor-trailer system is employed in this city. This system operates between the freight houses of the numerous railways and between private freight stations operated by the transfer company.

A considerable proportion of the l.c.l. transfer business in and between this city and East St. Louis, Ill., is carried by the Columbia Terminals Co., which handles an average of 3000 tons daily, of which 1000 tons consist of through freight transferred from one railway to another. This company acts also as a receiving and delivery agent for all the railways, and maintains private or off-track terminal stations in the business district at which it receives freight from shippers, assembles it for shipment and delivers the consolidated loads to the respective railways. Inbound freight is also collected at railway freight stations and transported to the company's local stations, where it is delivered to the trucks of the consignees.

Rates for transfer vary with the character of service. Between one of the Columbia company's stations and a railway freight house the rate is 11 and 13 cents per 100 lb., if between the two cities, or 7 and 9 cents if in St. Louis, the lower rate in each case being for outbound movements. For interchange, or transfer between two railway stations, 9 cents, if the movement is between the two cities. If the movement is between two stations in one city, the rate is from 4 cents for loads up to 10,000 lb., to 6 cents per 100 lb. for loads of 15,000 lb. and more. For various specific classes of freight there are special rates ranging from 13 to 37½ cents per 100 lb. In most cases a minimum of 27 cents a load is provided.

### Non-Glare Headlights in Ohio

COLUMBUS, OHIO, July 20—The law enacted at the last session of the Ohio General Assembly regulating the glare of headlights becomes effective Aug. 16. The new law provides that no headlights can be used unless covered by a lens approved by the Ohio Highway Commissioner. No certificate of approval of lens can be issued until actual tests have been made by that official.

The provisions are that a light shall be used to disclose any person, vehicle or object for a distance of 200 ft. ahead of the truck and no dazzling rays shall be used more than 3½ ft. above the surface and not more than 75 ft. ahead of the truck. No lamp shall be more than 32 candlepower. No spotlight can be used except when projecting its rays directly on the ground at a distance of 50 ft. in front of the vehicle and to the right of the center of the roadway.





THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice President      E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. O. Building  
239 West 39th Street, New York

CONTENTS

Vol. XXV, No. 2      August 15, 1921

LEADING ARTICLES

Are You a Happy Family? . . . . .	8
Trucks and Terminals of the Future. . . . .	10

MISCELLANEOUS ARTICLES

Safety Hints Make Better Drivers. . . . .	12
Here and There with Motor Trucks. . . . .	13
Watt Earned His Fingers—But. . . . .	17
Trucking Cost Accounting. . . . .	18
Hoist Body Raises Entire Load for Transferring Ice from Truck to Car. . . . .	22

DEPARTMENTS

Rebabbitting the Ford Cylinder Block. . . . .	14
The Better Way. . . . .	20
Buyer's Department:	
3/4-Ton Acason Speed Truck Sells for \$1,650. . . . .	24
Lease Truck a Newcomer in the Transport Field . . . . .	24
New Brockway Truck a 3/4-Tonner. . . . .	25
Well-Known Units in New Mutual. . . . .	25
Truck Accessories. . . . .	26
Shop Equipment for Fleet Owners. . . . .	28
Body Equipment . . . . .	30
Motor Truck Electric System Wiring Diagrams. . . . .	31
The Fleet Owners' Forum. . . . .	32
Editorial: The Association Ideal. . . . .	36

NEWS

New England States Check Up Loads. . . . .	37
Anti-Truck Campaign by Trolley Lines. . . . .	37
Indiana State Laws Called Unfair. . . . .	38
Wisconsin Classifies Truck Highways. . . . .	38

Index to Advertisers. . . . . 68 and 69

The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT

David Beecroft, Directing Editor  
F. E. Spooner and Sinclair Gluck  
Associate Editors

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1908, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

BRANCH OFFICES

Chicago, Mellers Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

SUBSCRIPTION RATES

United States . . . . .	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law . . . . .	.50c
Canada . . . . .	\$3.00 per year
Foreign Countries . . . . .	\$4.00 per year

ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

QUALITY



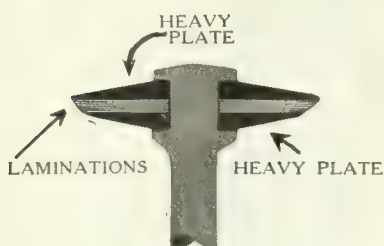
N  
O  
R  
M  
A

PRECISION  
BEARINGS



# Flexedge Valves

*Never Need Grinding  
and Always Hold Compression*



## The Valve Grinds Itself While It Operates

### NOTE

This is the third of a series of articles explaining the construction and operation of Flexedge Valves. The next article will be in Commercial Vehicle Sept. 15. Look for it.

Carbon—the mortal enemy of efficient valve action—is prevented from accumulating on the seat or the valve by the construction of Flexedge Valves. Instead of being one solid piece, the head is made of laminations held tightly together by heavy tapered plates at top and bottom. (See illustration.)

As the valve strikes the seat under the tremendous pressure that brings it down on the closing stroke, the edges of the laminations are flexed slightly (about .001"). This flexing action frees the seat of any carbon that might have been deposited and allows the valve head to seat itself perfectly, forming an absolutely compression-tight seal. This happens on every stroke—and the result is a bright, clean seat always. Perfect valve action results. Compression losses are stopped. Fuel consumption is reduced. Power is increased.

Flexedge Valves are made for all truck motors, regular sizes and oversizes. Write for literature and complete information.

**SELF SEATING VALVE CO.**

340 W. HURON ST.

CHICAGO



# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXV August 15, 1921 No. 2

## FOR A GOOD DAY'S WORK



*Read, on the Next Two Pages, How These Three Assets Have Made a Happy and Efficient Family of the Gridley Dairy Co. Drivers and Mechanics*

# Are You a Happy Family?

## An Experienced Superintendent Tells Some of the Ways to Keep Drivers and Mechanics Happy—and Enthusiastic for the Business

**A**NY fleet owner or truck superintendent of experience knows the importance to his business—the necessity—of contented drivers and mechanics. Unless the men are contented they will not work with enthusiasm for the ultimate good of the business. And if they do not work with good will toward the business, the business loses an asset that usually means the difference between mediocrity and success.

But how can a fleet owner or a truck superintendent create and maintain, among the drivers and mechanics, this contented, enthusiastic attitude toward the business?

One fleet owner and his superintendent have found the solution to lie in the application of three principles: Good Wages, Healthy Conditions and Considerate Treatment.

The company in question is the Gridley Dairy Co., Milwaukee, Wis. Otto C. Baumann, trucking superintendent, has had many years of experience in the trucking world, in the manufacturing as well as in the consumer's end of the business. In the Gridley Dairy Co. garage and the Gridley Dairy Co. policy, he has been able to put into practice the fruits of his experience. And the policy and practice have proved a striking success.

### First, Pay Them Enough!

"To me," said Mr. Baumann, "it is pretty obvious that if your drivers are to remain contented, you must pay them a reasonable wage. By that I mean a wage that compares favorably with wages paid for similar work in other firms in the vicinity. Presumably, you want your drivers to be better than anybody else's drivers. But you must do your share, in that case, and pay them as well if not better than anybody else pays his drivers.

"Of course, with our drivers it is a little different, because they are paid both salary and commission. But we consider that they fully earn their commission, or else we should not pay it to them, and therefore they are fully entitled to a fair and even generous salary in addition. What is more, it pays.

"With salary and commissions together our drivers earn somewhere in the neighborhood of \$75 a week. It is sometimes more and sometimes less, but that is about the average amount paid to them weekly."

In the opinion of Mr. Baumann, probably the most important item in keeping drivers and mechanics contented and happy, enthusiastic for the business and for the men who represent it, is the conditions under which those men work.

### Second, Keep Them Healthy!

In the case of the drivers, of course, their surroundings at the garage are not so important, because they are out on the road most of the time. But for all that, there are certain features at the garage which will make a lot of difference to the point of view the men have. For one thing, they should be



*Otto Baumann, a mechanic and an instruction book. Baumann is not a "white collar" man. He can do anything his men can do—and do it better*

supplied with lockers, not stuck away somewhere in a dark, dirty corner but where they can see what they are doing. They should have a wash room which is convenient and well lighted and which should include showers. And, if possible, they should have a lunch room and rest room which belongs to them and to no one else.

Then, for their own work, their trucks should, of course, be equipped with cabs which are really weather proof for winter work and these should be equipped with heaters. Moreover, in several types

of haulage, such as ice cream delivery, for example, the design of the body may make a good deal of difference to the driver's convenience and even his health. Many fleet owners are too prone to consider their trucks first and the drivers afterwards.

Not long since, The Gridley Dairy Co. fleet moved into a new garage, several views of which are shown on the opposite page. A study of these views will show how the garage has been designed, not only for the convenience of parking and repairs on the trucks, but to permit of the most healthy conditions for the mechanics and drivers working in it.

### Garage Design Important

The garage dimensions are 75 x 150 ft. These are the interior dimensions. There are four floors, the third and fourth being used for storage purposes and half of the second being used for wagon repairs.

The trucks are all garaged on the first floor and repaired on half of the second floor.

Probably the most important feature of garage design, from the point of view of keeping the mechanics healthy and happy, as well as the drivers, is that of temperature. This garage has heating facilities so that the ground floor, where the trucks are stored is maintained at about 50 deg. in winter, although no work is done there, other than oiling, greasing and filling up and this is done by the drivers.

However, the washroom for the trucks can be shut off from the rest of the ground floor and this can be and is maintained at 65-70 degrees in winter.

The second floor, where the mechanics and wagon repair men work is maintained at 65-70 degrees in winter.

But summer has been considered as well as winter. The ceiling of the ground floor is 16 ft. high, while the ceiling of the second floor is 18 ft. high. Thus fumes and smoke rise well away from the ground where the men work and in summer the rooms are high enough to be cool, airy and very comfortable.

The windows in a garage are important first for lighting and, second, for ventilation. This garage has wide, high windows, covering almost the entire surface of three sides, so that the men work in a building almost as well lighted as a greenhouse and one very easily and thoroughly ventilated.

Moreover, every feature which is calculated to assist the men in their work



and make that work convenient and easily handled has been supplied. The machine equipment is complete and conveniently placed and there are well-lighted, conveniently placed repair pits.

"Keeping an open mind," says Baumann, "Is one of the most important features in keeping drivers and mechanics happy. We're all human and I don't believe that I do everything the best way it can be done!"

"Therefore, if anyone comes in here and tells me he thinks he knows a better way to do things, I'm only too glad to

consider it or try it and to give that man credit for his idea, if it works out well, whether he's the president, the janitor or the office boy. The president himself has this same idea and it extends through the entire organization. That has helped to make us a happy family.

"Then, too, it pays sometimes to let people think they are right. A driver came to me and said that his Ford wouldn't start on the mag. and could he use the battery in starting. Well, I took the key out, turned it upside down and put it in again. I turned it clock-wise

and to the right. 'Now try it,' I told him.

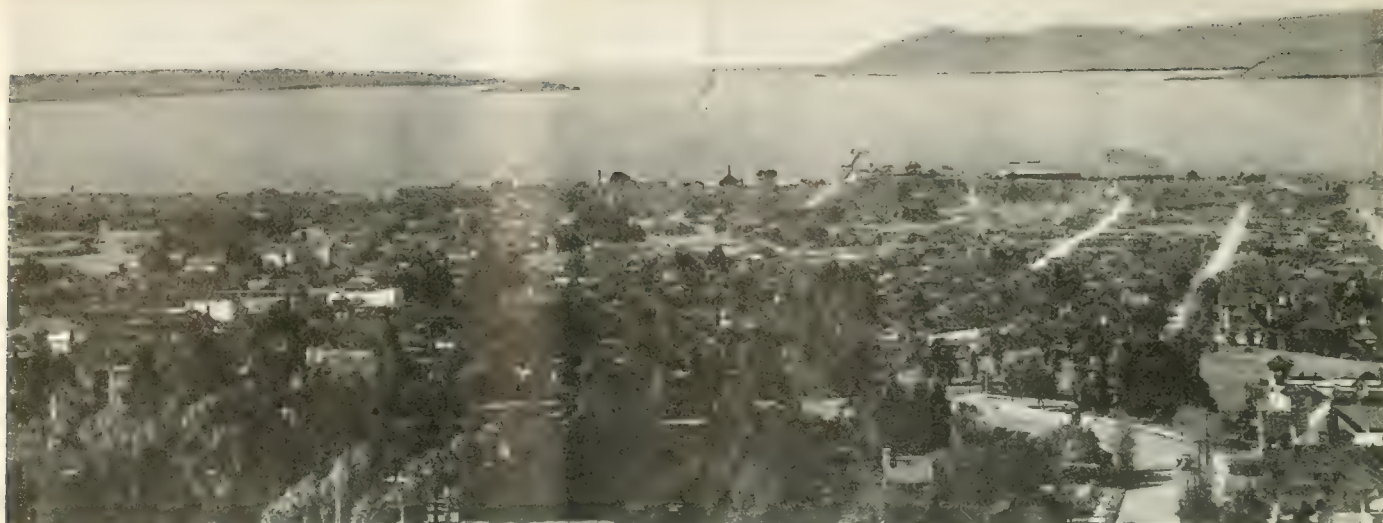
"He turned her over and presently she started. 'That's right,' I told him, 'you start on the battery and run on it after this.'

"He came back the next day and said that she worked fine on the battery. But there was no battery in the machine. I had turned the key the same way, only upside down. Still it made him happy and that was the main thing. Sometimes you can kid them along a little, like that, and keep them happier so."



**SOME VIEWS IN THE GARAGE.** 1—One side of repair department, showing a bench, machine tool equipment on the right and the elevator on the extreme left. Note the overhead crane and the high wide windows. 2—This is the spare parts stock room, immediately back of the repair department. Note the excellent lighting and the high ceilings in this and the other two views. 3—The other side of the repair department, showing another bench, the repair pits and the same overhead crane. The radiator it carries can also be seen in the first view. Similar high windows are on the extreme left in this view. 4—Washroom for the drivers and mechanics. Note the shower





*Site of the new Berkeley, Cal., port terminal, as it appears to-day, showing four of the five 80-foot paved highways which will be extended on to and through the terminal to shipside, for the use of motor trucks*

# Trucks and Terminals of the Future

## *Trucks and Railroads Equally Considered in Plans for Projected Giant Pacific Terminal*

By H. H. Dunn

### Plans Already Completed

A combination of municipal and private enterprise has completed surveys, plans, engineering estimates and reports, with the approval and consent of the Federal Government, for the construction of a port terminal on the eastern shore of San Francisco Bay, directly opposite the Golden Gate, and about one mile nearer that historic path to deep salt water than are the wharves of San Francisco.

This deep-water improvement, which has been incorporated as the Pacific Port Terminal, Inc., will cost several millions of dollars. It is intended to furnish adequate facilities for the handling of a large part of the trade of the countries bordering on the United States with the latter country, a commerce valued, in 1920, at more than two billion dollars, and increasing at such a rate that foreign-trade experts estimate that it will be doubled within the next five years.

One of the most prominent features of this terminal—which offers when completed, 140,000 lineal feet of berthing space, with 30 feet of water at mean low tide—is the serious consideration which has been given to equipment and facilities for the accommodation of motor truck lines throughout the terminal and on the 6000 acres of manufacturing and industrial sites on the mainland directly back of the terminal.

Five main highways, leading through Berkeley, Emeryville, Oakland and Alameda, averaging 80 feet in width, lead to the site of the terminal. Each will be continued, in loop form, through the industrial section on the mainland, and from this loop, provision is made for paved streets, equally wide, to every wharf-shed in the 3,000,000 square feet of wharf-shed space on the filled-in bulkhead of each unit, and to every warehouse on the 3,500,000 square feet of warehouse space, on the filled front of the mainland, just back of the projecting quay of each unit.

### Two Wide Paved Ways

In addition, there will be two wide paved ways, running out each quay to the head of the bulkhead, for the use of automotive vehicles, so that motor truck lines may deliver their freight direct to shipside, in exactly the same manner as transcontinental freight cars. Special loading and unloading machinery for motor trucks is included in the plans for the equipment of each quay, and motor trucks will be handled in the same manner as freight cars, with clearance kept for them throughout the wharf-sheds and in the warehouses.

The classification yards for freight cars have a capacity of 2000 cars, with sidings to the deep-water end of each quay. While classification yards will not be necessary for motor trucks, large space has been provided alongside the car yards for motor truck use.

With a high percentage of the raw products imported into the United States

FOR ultimate economy, motor trucks will some day be given equal consideration and equal facilities with railroads at terminals.

Motor trucks are not, broadly speaking, competitors of the railroads, any more than buses are competitors of the street cars. There is a field for each. Trucks or buses are supplementary in each case.

But up to the present, trucks at terminals, being newcomers, have been very much in the position of interlopers. The railroads are long established and rail facilities at terminals were the prime consideration in building those terminals. As the trucks came afterward, they were not considered at all during the construction and are not considered now, except in a makeshift way. They shift for themselves, as best they can, and as a result do most of their terminal work under difficulties involving loss of economy in many directions.

But California has led the rest of the country in the establishment of wonderful permanent highways. She has led the rest of the country in the establishment of first-class, highly organized inter-city bus lines. And now she is about to give the lead to the rest of the country in the establishment of an enormous shipping terminal in San Francisco bay in which trucks will have equal facilities with the railroads.



coming every year through the ports of the Pacific Coast, it has been considered necessary to establish a foreign trade zone (possibly better known as a "free port") on this terminal. To this zone raw products may be imported without duty, manufactured in plants within that zone, and again exported. Virtually all the raw products so brought in will be handled from ship to factory and back again by motor trucks. There being no inland shipments to go out from this foreign trade zone, railroad tracks will not be necessary in it, and motor truck distributors of San Francisco, Oakland and Berkeley are expecting that virtually all this large traffic will create a considerable demand for trucks.

### Ramps to Ships' Decks

Motor truck lines which operate to some extent out of the ports surrounding San Francisco Bay into much of northern California and Nevada will have direct connection with trans-Pacific steamers, instead of having to ferry, much of the time, across the bay to and from San Francisco for their cargoes. This will mean a tremendous saving in costs of operation for every owner of motor trucks in northern California, and, doubtless, will increase the number of these fleets in operation.

Plans for the equipment at the outer end of each quay of the port terminal include ramps by which motor trucks can be driven directly onto any deck of a berthed freighter, loaded and driven off again, in case there are any difficulties in the way of loading or unloading a cargo ship-side. This also means a reduction in operating costs and greater

efficiency in handling freight to and from the trucks.

Surveys and reports on the new terminal have been made by B. F. Cresson, Jr., chief engineer to the New York-New Jersey Port and Harbor Development Commission, and Charles W. Staniford, former chief engineer of the Department of Docks and Ferries of the City of New York. The War Department, through Gen. Lansing H. Beach, chief of engineers, has instructed Col. Herbert Deakyne, United States district engineer for the northern California district, to proceed at once with further surveys, to the end that he may submit estimates of the cost of the Federal Government's participation in channel work for initial development and also his recommendations for the work. As Col. Deakyne already has submitted a preliminary report, it is believed that the War Department is ready to proceed with the work on the channels, first instructions on the first survey having been given in the appropriations section of the Rivers and Harbors Bill of June 5, 1920.

### Direct Truck Connection

Approximately 10,000 miles of highways suitable for the operation of motor trucks, over the majority of which trucks are now operating, will be given direct connection with deep-sea commerce by the construction of the first unit of the new port terminal at Berkeley. Connection also will be made between motor truck lines and the inland waterways service of steamships and motor boats, on the Sacramento, San Joaquin and other navigable streams entering San

Francisco Bay, as well as with all the towns on the 116 miles of water-front of that bay.

Rufus P. Jennings, of Oakland, who was largely instrumental in bringing together the municipality of Berkeley and private interests for the construction of the Pacific Port Terminal, insisted on the inclusion of all provision for motor truck terminals, loops, parking spaces and cargo-handling facilities, in the first survey and report on the terminal. To the writer, Mr. Jennings said:

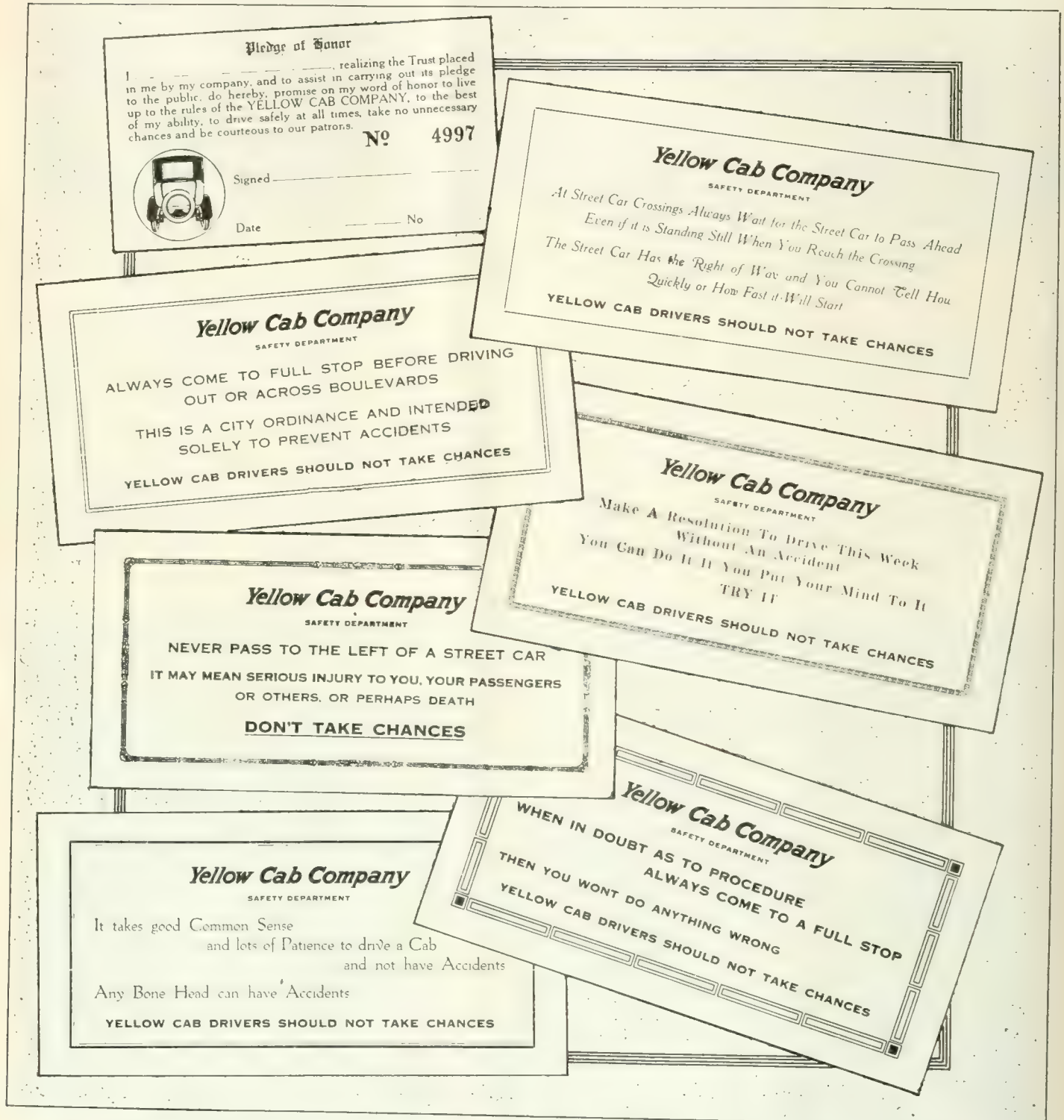
"We think we are using a great many motor trucks to-day, but we are just in the first gray dawn of the real day of automotive transportation for freight. Within the next five years, we shall begin to see the morning; and in ten years, we shall wonder how we ever handled the traffic of this country on rails alone. We must prepare all our ports, all our wharves, all our terminals, with plenty of space for hundreds of motor trucks, and we must equip every wharf with the best obtainable machinery for handling cargoes between motor trucks and ships.

"On the new Pacific Port Terminal the motor truck will have the same accommodation, the same consideration, the same equipment as the transcontinental freight car, with this advantage, that the motor truck will be able to run on board ship and leave or take off cargo directly on deck, while the freight car must wait outside. This, however, is due to the greater mobility of the motor truck, and not to any desire on the part of the builders of the Pacific Port Terminal to give any one means of transportation an advantage over any other means."



First unit of the projected new port terminal which Berkeley, Cal., is preparing to construct on the eastern shore of San Francisco Bay, in combination with private capital. On this terminal motor truck lines are placed on an equality with the rail lines, as regards both space allotted and facilities offered to shipside and warehouses. There will be two wide driveways for trucks, and ramps enabling the trucks to run out onto ship decks when necessary

# Safety Hints Make Better Drivers



These "Safety Hint" cards are printed every now and then by the Yellow Cab Co. of Chicago and distributed among the company's drivers. The cards are designed primarily to reduce accidents. They are printed on cards of different colors, in inks of different colors and are attractive to look at and convenient in size. The pledge in the upper left hand corner is another feature designed by the company to insure better drivers. Fleet owners might well adapt the idea to their own trucking, extending the safety idea to include conservation of gasoline, tires, etc. They may find a considerable difference in the efficiency of the drivers, after installing such a "reminder" system



# Here and There With Motor Trucks



1



2



3



4

1—Line-up of eleven trucks in excavation work for a new building in San Francisco. Because of the loose condition of the earth, the runways for the trucks had to be laid in three tiers, criss-crossed to afford ample support for the weight of the trucks. 2—This Atterbury 3½-tonner came to the rescue of a steamer! The DIARAGO of the Texas Steamship Co. wirelessed for a new cylinder and, failing railroad transportation, the truck rushed the cylinder from Buffalo to the next port of call in Maine. 3—A housewarming in a new garage. Emmons Drayage Co. employees acting as caterers, cooks and waiters between the ranks of their vehicles. 4—Mack 3½-ton demonstration chassis mounted on a 5-ton chassis. The working parts of the smaller vehicle are exposed and run by a pulley from the mechanism of the 5-tonner.



# Rebabbitting the Ford Cylinder Block

*Loose or Worn Babbitt in the Ford Block Results in a Noisy Operation Through Lost Motion—Rebabbitting Is the Solution of the Problem*

**I**F the babbitt in the Ford cylinder block is loose or much worn, the block will have to be rebabbitted. This can be done with a babbitting jig as follows:

Hold the block on the engine stand so that it is bottom side up and the cylinders as nearly perpendicular as possible.

## Removing Old Babbitt

Remove all of the old babbitt. This is best accomplished by cutting out a strip at the bottom of the bearing as shown in Fig. 1. After this is done, it will then be possible to drive out the



*Fig. 1—Method of removing old babbitt by cutting out a strip at the bottom of the bearing*

two remaining pieces, usually driving the babbitt out of the anchor holes. Any babbitt which remains in these holes should be drilled out.

The success of pouring depends largely on the next operation, namely, to provide a clean, dry surface for the babbitt. Dirt and grit work up in the hot metal spoiling the boring tool or scorching the crankshaft. If water or oil is present, even in the smallest quantity, there will be blow holes in the babbitt. If it is present in large quantities, it will be impossible to pour the babbitt at all.

## Temperature of Metal

The temperature of the metal is also very important. Perfect bearings can be poured only with metal between 800 and 840 deg. Fahr. If no pyrometer is available, this temperature may be estimated by the appearance of the metal.

At about 900 deg. the pot and metal turn red and the metal "burns," coating rapidly when the scum is scraped off. When at the proper temperature the metal appears like quick silver and tarnishes slowly when the scum is scraped off, the coat of tarnish showing all colors. When too cold the metal acts sluggish and the tarnish takes on a dull appearance. Some mechanics check the temperature with a piece of soft pine. The stick should char immediately, but will not catch fire unless held in the metal for some time. The stick should be perfectly dry as the moisture would cause the metal to fly off endangering the operator.

The equipment for forming the bearings should be set up according to the instructions of its manufacturer.

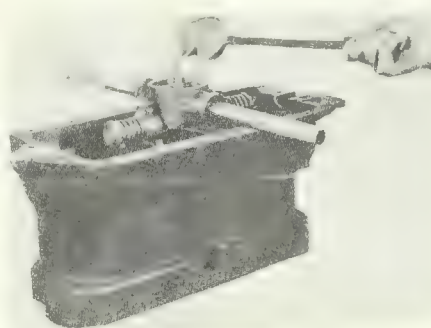
If there are no plugs in the bar to fill the oil holes, it is necessary to fill these with asbestos waste before pouring the metal to prevent the babbitt flowing through them. This waste together with the babbitt which covers it is later punched out.

## Cold or Heated Blocks

Good results have been obtained by pouring into cold blocks instead of heating the block and molding bar. It is stated that this method makes for a cleaner condition of the parts. Heating with an open flame, it is stated, results in a deposit of carbon.

## Pouring

While bringing the metal to a heat the ladle used in pouring the babbitt should be in the pot in order that it

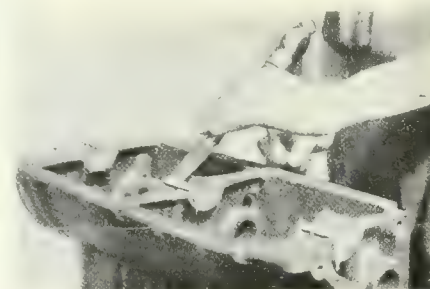


*Fig. 2—Pouring the babbitt with a two-lip ladle. The scum should be pushed back to provide only clean metal for the bearings*

may be about the same temperature as the metal. When ready to pour either two ladles or a two-lip ladle should be filled with babbitt, pushing the scum back to provide only clean metal for the bearings. The metal should then be poured rapidly from both sides at the same instant as shown in Fig. 2. Sufficient babbitt to more than form the bearing should be poured. The metal sets quickly so that the bar may be moved immediately the babbitt has been poured.

The next operation is to cut off the "wing." The chisel should be introduced from the inside of the bearing as shown in Fig. 3.

The final operation in repairing the rough bearings is to peen them to con-



*Fig. 3—Cutting off the "wing" with a chisel which should be introduced from inside of the bearing*

form to the cylinder block. At the Ford plant this is done with a special tool, as shown in Fig. 4. It may, however, be done by the use of a round bar .010 in. larger than the bar used in pouring the bearings. The bar should be laid in the bearing and struck with a lead hammer.

## Reaming Bearing

The bearing is now ready to be line reamed. This should be done according to the instructions accompanying the machine or fixture. It is important that the finished bearing be the correct distance below the lower surface of the block and as there is no adjustment on the center distance of the time gears it is essential that the fixture locates from both ends of the camshaft hole. See Fig. 5.

If the caps are to be bored at the





Fig. 4—Peening the rough bearings to the cylinder block. A round bar will serve the purpose

same time as the cylinders, as is done at the Ford plant, temporary shims .0126, are placed under each side of the tap before drawing down the bolt. These shims are later replaced by thinner ones when installing the crankshaft.

### Dressing Off Edges

When the bearings have been bored, the edges should be dressed off on the 45 deg. The boring turns up a wired edge which should be removed with either a file or a bearing scraper. The surface on which the cap rests should be free from dirt, babbitt or burrs. The ends of the bearings should be finished off at 3/16 radius to clear the radius in the crankshaft. The tool used for reaming the bearings may be provided with a cutter for this purpose or this may be done with a bearing scraper, no special care being necessary as the radius is not a working surface.

The bearing should have a smooth appearance as shown in Fig. 6.

The next operation is to clear the oil holes and grooves. The grooves are placed only in the center and main (rear) bearing as shown in Fig. 6.

If there is no arrangement on the bar to form these grooves, they should be chipped out with a cape chisel as shown in Fig. 7.

The crankshaft should next be laid in the bearing; the babbitt extending over the ends of the main bearing and cap should be dressed off with a mill file until the shaft fits well down in the bearing. New jobs should have about .004 in. end-play.

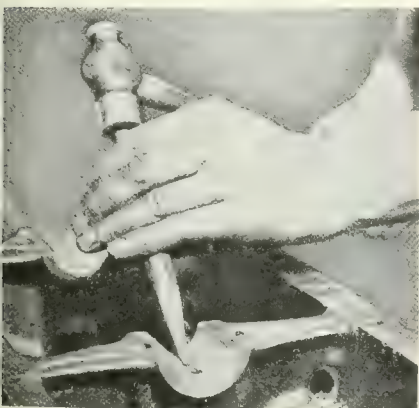


Fig. 7—Forming the grooves on the bearings by chipping out with a cape chisel

It may be opportune to state at this point that all the play is taken up by the main (rear) bearing and its cap. The center and front bearing should have clearance to allow for the unequal expansion of the shaft and cylinder block.

### Checking Bearing Alignment

The alignment of the bearings should be checked. The proper way to do this is with a test bar or straight edge which will cover the three bearings at once. In using the bar lay down strips of thin cigarette paper on the bearings with one end protruding. Lay the bar in place and try to withdraw the papers. If the bearings are in line all papers will feel the weight of the bar.

The alignment of the bearings may be checked by the crankshaft which should first be straightened to a limit given in Fig. 8. The shaft is tried in the bearings by tapping the ends and center to test for rock. Another way is to put a narrow strip of thin paper in the bottom of each bearing. The shaft is then laid in place and by pulling on the papers the fit of the shaft may be



Fig. 6—The bearing should have a smooth appearance and the oil holes and grooves should be clear

tested in all excepting the main bearing in which the end clearance may be sufficiently small to grip the paper giving a false impression.

After checking the shaft in one position it should be turned half way around and checked again. If found to be O.K. oil the bearings, both in the block and on the shaft and replace the shaft.

### Assembly Crankshaft

New or rebabbitted caps should be used in assembling the crankshaft, and sufficient shims should be placed equally under each side to allow the bearing .006 rock; that is the bearing will be drawn down .002 to .003 in. for burning in. These shims may be purchased from any Ford branch. They vary from .002 to .0025 in. thick. Ordinarily two or three shims should be placed under each side. The bolts should then be drawn down as tightly as possible without straining the threads.

### Bearing Tightness

The tightness of the bearings may be tested with the turning bar. Loosen two of the caps and try to turn the crankshaft over with the turning bar. The bearing should hold the shaft so that taking an 18 to 20-in. hold on the bar the mechanic will be able to turn the shaft over. In the same way test the other two bearings. With more than

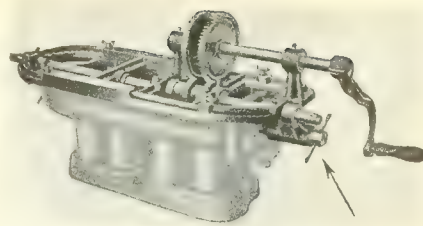


Fig. 5—Fixture for line reaming of the bearings. It is important that the finished bearing be the correct distance below the lower surface of the block

one bearing tight the mechanic should be unable to turn the shaft until after the block has been run in.

The next operation is to run in the shaft. This requires a running-in stand. The speed varies with the different makes of stands, the strain on the stand and the driving unit being the main consideration.

The bearings should smoke freely and should be oiled while they are being run in. If they do not smoke it indicates a loose fit and some shims should be removed from each side, the bearings being tightened and run in again.

When sufficiently run in the shaft may be turned over by the hand wheel on the running-in stand or by means of a 20-in. bar equipped with pins to fit into the holes (not dowel pin holes) in the crankshaft flange.

When this condition is obtained the main bearing cap should be removed the entire length of the cap and covering at least 80 per cent of the surface. If the cap does not meet these requirements, it should be rerun, taking out one or more shims from each side.

While it is not necessary for an experienced operator to remove the other caps it is advisable for the beginner to do so on the first few blocks so that he may be sure his work is correctly done.

### Try Truck on Trolley Tracks

NEW LONDON, CONN., Aug. 6.—President L. S. Storrs of the Connecticut Co., Robert W. Perkins, receiver of the Shore Line Electric Railway Co., and one or two officials of the New York, New Haven & Hartford Railroad are expected here to witness a demonstration of a gasoline driven truck on the tracks of the trolley road. The local representative of a four-wheel drive truck has had car wheel flanges attached to the truck wheels and will demonstrate the truck to these officials. The experiment will be the first of the sort tried out locally.

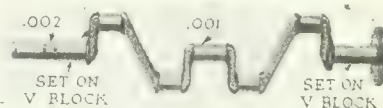


Fig. 8—The alignment of the bearings may be checked by the crankshaft, which should be first straightened to a limit shown above

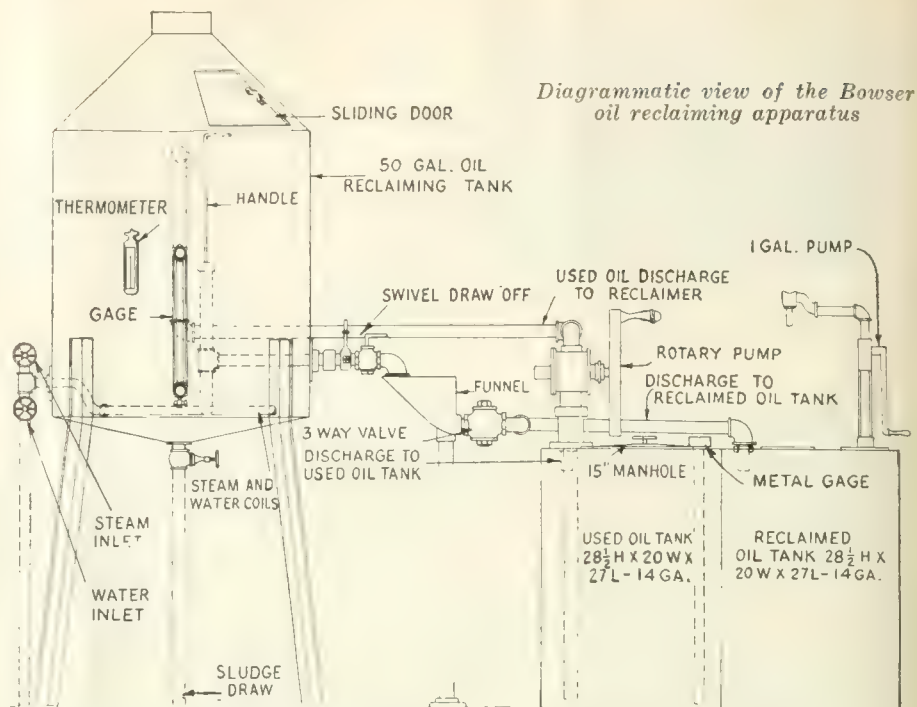


## Two New Accessories for Fleet Owners

**The Bowser Method of Salvaging Diluted Oil Will Result in Substantial Economies in Truck Operation—The New Smith Cushion Truck Wheel Has Only Four Parts and Weighs Little More Than the Ordinary Wheel-Taking Solids**

A METHOD of salvaging diluted oil for further use has been developed by S. F. Bowser & Co., Inc., Fort Wayne, Ind. A satisfactory method reclaiming crankcase oil, such as this, would result in substantial economies in truck operation. With the comparatively heavy fuels now being consumed, the oil in the crankcase becomes diluted with the heavy unburned ends of the fuel. This dilution not only reduces the viscosity of the oil to such an extent that it is no longer a lubricant, but also results in an actual loss of power. Furthermore the wear on the working parts is greater. This results in increased contamination of the oil with solid particles. The result is that it is necessary to change the oil very frequently in order to avoid these difficulties.

The illustration shows the layout of the Bowser apparatus diagrammatically.



In the reclamation of the used oil there are two separate operations which must be performed in order to restore the original viscosity, fire and flash points. First, it is necessary to eliminate the dilution, and, second, all harmful solid foreign matter in the oil must be removed. The gasoline is driven out of the oil by the action of the steam operating on the same principle as in a still. The foreign solid matter is removed by precipitation, a coagulant being added to

hasten the process. The total cost of operating the reclaimer, including labor and steam, is said to be approximately 5 cents per gallon.

The system illustrated is manufactured in 50 and 100-gal. sizes. In the smaller size, the clean and dirty oil tanks have a capacity of 65 gals., and in the larger size the individual capacity of these tanks is 170 gals. A 500-gal. size is also manufactured.

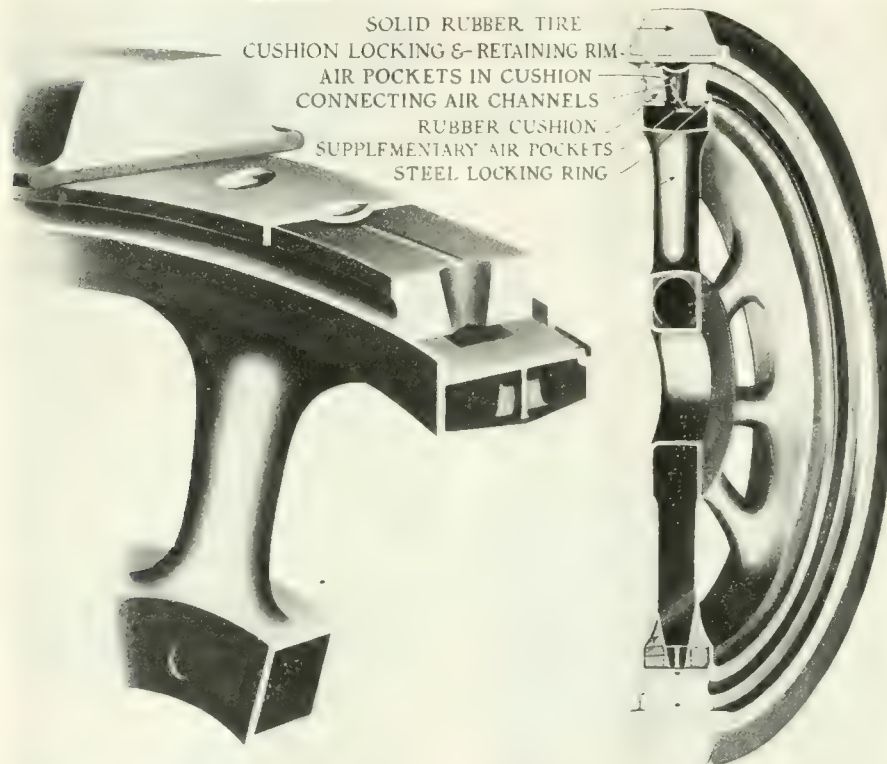
## Smith Cushion Truck Wheel

SIMPLICITY and light weight are important features of the new Smith cushion truck wheel. The wheel itself has only four parts—the wheel, cushion, steel locking ring and cushion retaining rim. When the four parts are assembled, all are held in place automatically, and the wheel is ready for the pressed-on tire. There are no bolts, keys or pins. The weight of the wheels is but little more than that of the ordinary wheel taking solid tires.

The design and location of the cushion give perfect suspension and greatest effectiveness. The cushion, it is stated, being right next to the tire, yields the highest resiliency, which is increased through a design of openings in the cushion. The latter is automatically air-cooled by the connection of all openings in the cushion with an air passageway running to all of the openings in the periphery of the hollow wheels, which radiates the heat.

The wheel has been designed to prevent creeping of the tire on the cushion and the cushion on the wheel. The wheel proper is made of the same materials and in the same way with internal braces—as the type of Smith wheel which has been marketed in the past.

The maker is the Smith Wheel, Inc., Syracuse, N. Y.



View showing the simplicity of the Smith cushion truck wheel



# Watt Burned His Fingers—But—

By SINCLAIR GLUCK



ROSS settled into the familiar chair, facing the president of the company, and wiped the perspiration from his forehead with a sigh. As he did so, he glanced a little enviously at Old Hammerhead, as his men affectionately called their president. For no matter how hot it was, old Silas Gunther always seemed to look cool.

"Well, Ross," the old man began, "you look sort of unhappy. What's the trouble?"

Ross wiped his forehead again. "Well, sir, I don't know whether it's business or the heat, but maybe it's a combination of the two."

The old man laughed. "Cheer up, man. We're still alive, you know, and as long as we're alive, why business isn't dead. Though, I'll admit it looks mighty sick. How many trucks are off the road altogether now?"

Ross gave a groan. "Eight of them, sir, and I may have to take another one off to-morrow. There isn't enough business on route twelve to keep a small boy with a toy wagon busy. But you probably know that."

"Yes, I know it," Old Hammerhead nodded. "Perhaps you'd better let Jones handle twelve as well as route eleven. But I sent for you because I want to talk about steam engines."

Ross was used to having the old man spring surprises on him. But this one nearly took his breath away. "You don't mean instead of trucks, do you, sir?"

Old Hammerhead laughed. "No, I don't mean instead of trucks exactly. I mean by way of example."

The old man paused and Ross, who had grown to look forward to Old Hammerhead's little stories, settled himself in his chair to listen.

"If I remember correctly," Old Hammerhead began, "there was a fellow named Watt, a good many years ago, who tried out some experiments with an ordinary tea kettle. That tea kettle was originally intended, I suppose, to boil water for his tea. But that didn't make any difference to Watt. I believe that he noticed that the steam forced up the lid of the kettle. And he got so interested that he burned his fingers, trying to keep the lid down."

Old Hammerhead paused. "But the point is that, no matter what the kettle was originally intended for, it gave Watt an idea. And he persisted in that idea,

Ross, even though he burned his fingers. As a result, we have the modern steam locomotive, steam stationary engine, triple expansion marine engine and steam turbine. And all these wonderful modern conveniences are a far cry from boiling water for tea!"

Ross felt the old man's inquiring eye on him, but he could only shake his head. "I'm afraid I don't get you yet, sir."

"Well, Ross, let's see," Old Hammerhead went on. "Seems to me that I read an editorial the other day in our best morning daily, complaining of the high cost of foodstuffs. It said that potatoes were selling for \$1.75 a bushel here in town, and out on the farms, not ten miles away, the farmers were trying—and failing to sell them for sixty cents a bushel."

For a moment Ross wondered whether the heat had affected the old man's head. But Old Hammerhead looked sane enough. Presently he went on again.

"Then, too, it seems to me that there has been an awful lot of talk lately about the high cost of shipping goods from here to Winonka, some eighteen miles away, and of shipping goods from Winonka back here. The shippers complain that they don't get any kind of service from the railroad and that the freight rates are too high. The railroad turns around and complains that it isn't making any money on these short hauls and that it is just about ready to raise the rates again, if they'll let it. And, lastly, the public is registering a general complaint all along the line about the high cost of commodities—a high cost due directly to the high cost of transportation. Of course, nobody pays any attention to the public, for a time. But the public usually gets its way in the end—and sometimes by means of the sort of buyers' strike that we are up against at the present time."

Ross nodded, but he still looked puzzled.

"Then the public has another grievance. That's high rents. The high rents are due to lack of accommodation and the lack of accommodation is due to lack of building. But maybe this in its turn is due to the high cost of building and the high cost of transporting building material.

"It seems to me, too," Old Hammerhead added, "that the farmers around this part of the country are in the buyers' strike, not so much because of the cost of commodities as because of the fact that they are hard up and do not want to spend the money and the time to come into town to make purchases."

Again Old Hammerhead looked inquiringly at his superintendent. But Ross showed him a blank face.

Old Hammerhead laughed. "Well, Ross, I'll explain. You see we have eight trucks lying idle in the garage now and we'll have nine to-morrow. We've got a big investment tied up in those trucks, Ross. When they're not making money for us—when they're idle—they're costing us a lot of money. Now those trucks were originally intended for what, Ross?"

Ross sat up. "Why to call for our freight and make our deliveries."

Old Hammerhead nodded. "That's right, Ross. And the tea kettle was originally intended to boil water for tea. But if we can't use our trucks for what they were originally intended and if we can find a use for them, why not experiment a little?"

Ross got to his feet. "I get you, sir. Why couldn't we start some of them out on the road collecting farm products? And why couldn't we start an interurban freight line with the rest of the idle trucks? That's what you mean, isn't it, sir?"

Old Hammerhead nodded again. "Exactly, Ross. We might even start some of them out carrying some of our smaller goods to the farmers' doors, to save them the trip to town."

There was a moment's silence. "But the big thing is, Ross, that if our trucks, or anything else we have is idle and non-productive, let us use out inventive ideas, the same as Watt did, and see whether we cannot find some other productive use for those things—even if we burn our fingers a little, Ross!"

"By golly, sir, you're right!" said Ross.



# Trucking Cost Accounting

## *The Importance to the Business of Tying Truck Costs into the Books*

By EARL S. CLARK\*

**T**HIS subject, Trucking Cost Accounting, is one that needs most careful consideration, and my object is to place before you a few facts that seriously concern the future success of your industry.

This is not the time nor place to discuss theory or imaginative schemes. While I appreciate that all successful enterprises can trace their origin to the imagination of a certain individual, yet I contend that the enterprises would not have been successful without the application of correct methods to develop the ideas.

Your object is to render efficient trucking service. I am not here to discuss the cost accounting methods of truck manufacturers, but rather to talk about the cost accounting methods of truck operators.

Regarding accounting and organization matters, one of the most important features that we have to consider is the shipping or delivery end of the business. That involves the trucking. Shipping by motor trucks to-day, in fact, has become one of the most important methods of shipping, and rightly so, as it is fast superseding the railroad. Why, just think of it, to-day a manufacturer can load a truck at his platform, deliver the goods at the destination—on the customer's platform—without any extra packing and at less cost than the railroad. Not only that, but the load is delivered in better condition than it would be if packed in a freight car.

### **They Do Not Know**

I find that truck operators have little knowledge as to the cost of operating their trucks. Many of them had fair success when they operated one or two trucks, but when their business grew and complications multiplied, their troubles began.

The first thing a truckman or a trucking concern has to do is to render service and how can they render a service efficiently unless they know what they are doing and what it costs? If you are performing a piece of work for a customer and you know that you are going to lose money on the proposition, you can not do it with the heart, or with the

vigor that is possible if you know you are going to make a reasonable profit.

Only a few days ago I had an occasion to come in contact with a firm that had a machine to be shipped a distance of about eighty miles to a little town outside of Boston. They received several bids, the prices ranging anywhere from

### **Read This Article!**

Truck operators, as a class, do not know enough about what it costs them to operate their trucks.

Truck transportation is a great business. It is growing in power and influence daily. And it is worthy of first-class business methods.

Accurate costs are absolutely essential to first-class business methods. But as yet, fleet owners have not realized their responsibilities in this regard.

In this article, Mr. Clark describes our short-comings in keeping costs and how they can and must be corrected.

Read it carefully and apply it to your own trucking.

### **It Means Sound Business**

\$40 to \$175 for the single machine. The quotations didn't include any packing whatsoever, simply the placing of the machine on the truck. All bids considered delivery over the same route. The lowest bidder lost money.

There was another case where a load of furniture was taken from Springfield to a small town outside of Providence. The prices quoted ranged from \$50 to \$250 for the same load. Just think of it, \$50 for taking a load of furniture over the roads between Springfield, through Southbridge to Providence. Some of these truckmen were figuring their costs right and others were not.

### **What Causes Failures**

I had occasion to come in contact with bids for trucking a load of machinery from Bridgeport to New London. There were five prices quoted and no two prices were alike. There must be a reason for it.

Mr. Edward N. Hurley, formerly of the Federal Trade Commission, said that

over 75 per cent of the failures to-day are due to lack of costs. I know that his statement is correct. On the other hand, his statement has been misconstrued by many executives. He meant proved costs from the bookkeeping standpoint. What do I mean by proved costs? I mean costs that account for every dollar recorded or contracted for as spent on the books.

When you begin the operation of a corporation, and this corporation is incorporated for, say, \$100,000 or even \$50,000, the money is invested for a purpose—it is put in there to use. You take some of that money and you buy, perhaps, two, three or four trucks. You buy tires, equipment, oil, gasoline and so on, and when you have the equipment and other supplies ready, you start to do business. When all of this is combined with labor, the final result is that you are selling trucking service. Every dollar that is put into that concern is used in producing this trucking service. Now the question is this: What does it cost?

### **How They Figure Costs**

I find that many people operating trucking cost accounting methods estimate the cost of running a truck in this way: They say that Bill Jones, an employee, is paid \$4 or \$4.50 a day, his assistant is paid \$3. They figure that they will use so much gasoline, oil, so many tires, etc., and these concerns figure their costs on that basis. It may seem ridiculous, but I find about nine-tenths of the trucking companies estimate their costs in this manner, not even attempting to prove them and tie them into their books.

Consider the payroll. A part of the capital or revenue received is later on turned into payroll and is paid out to the men who operate the trucks. Have you ever tried in your own business to take the payroll itself, say it amounts to \$3,000 for a certain period, and attempt to ascertain whether it was distributed properly over the trucking costs? I have actually found that in most cases the labor charged on the trucking costs is less than the labor recorded on the payroll. What does this mean? It means that the costs are understated.

### **Tie Them Into the Books**

You say that you use so much gasoline, oil, so many tires, and so on. Have you ever attempted to verify the cost of

\*This article is the gist of a speech made by Mr. Clark before the Motor Truck Association of America.



supplies used, matching them against the inventory accounts on your books? Why wait until the end of a year to find out such important figures? Have you adopted some kind of system of simple bookkeeping that is sufficient to satisfy the bank? The banker is the man to satisfy in the end, as the question with him is: What have you got to loan on? When you come to speak about costs, he is not interested in fancy forms and so on; he is interested in the results, in proving that every dollar spent for expense has gotten into these truck costs. There are but few concerns in your line that can furnish a correct banking statement, and I speak through knowledge, not hearsay.

A short time ago I had occasion to speak to an executive of a trucking concern that is widely advertised throughout the country. He has been widely quoted. He has stated that if you will use a certain standard uniform cost system, you will equal his saving of \$5,000 in a given period. Six months later I had a consultation with him in regard to his finances. The trucking costs were not right. He estimated the trucking costs and attempted to operate a uniform system of truck cost accounting, but he had not tied it into his books in any way. When he closed his books at the end of the year, instead of making the profit of 28 per cent, the net profit was 3 per cent. There was a reason for this variation of 25 per cent.

### Not Always Accurate

Another concern referred to the savings they had made in regard to tire mileage and what they had saved on tires. I looked into the matter very carefully and discovered that the tires used amounted to at least one-quarter more than they charged on the truck costs. The truck operators had consistently stolen tires from the stock room and sold them, taking the money received themselves.

Suppose you send a man to take a tire from stock. Tires in many instances amounting to well over \$100 apiece are taken without any record being made. If you trace some of these items which are supposed to be entered in the storeroom and under control, you will find that they are never included as a part of the trucking costs.

I have found that many firms operate detailed cost sheets without any financial accounting system, and when the banker asks them for a statement of conditions, they are unable to furnish it.

Speaking of oils and grease, they are nothing but money in another form. You invest so many dollars in so many barrels of oil and so many cans of grease. They represent dollars and cents and some record should be kept of this material. Many trucking concerns do not operate any storeroom. You can actually make or break any concern carrying an inventory, through the inventory itself.

### Time Basis Best

During the period of investigation, I found that there are various methods of

computing costs used. Certain concerns prefer the ton-mile basis. Others prefer the straight mileage basis and others prefer certain other types, but I find that very few use the basis that in my estimate is the only way, not because I say so but because I have proved it.

When you go to your banker to obtain a loan, you are loaned the money on a time basis; you borrow for 60 or 120 days, or whatever it may be. Your life is regulated on the time basis; there are a certain number of years that you will

---

### What the System Costs

*On request you will be sent filled-in sample sheets of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system, including binder, 500 cards and 50 sheets, is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.*

---

live. You operate your business on the time basis—nine, ten, eleven, or twelve hours per day, in fact you cannot find a thing that is not regulated somewhat by time.

We will take the ton-mile basis of figuring the cost of trucking. Suppose, for illustration, your load varies; to-day you carry a load of feathers and to-morrow you carry a load of pig-iron over the same route. What does your ton-mile record amount to?

Now we will take another basis—the straight mileage basis. Suppose you send a load over a macadam road that is in good shape? Let us say a 50 or 75 mile trip and you figure the cost per mile. It takes less gasoline to run your truck over a good road than over a poor road, and there is less wear and tear on your truck, and so on. Suppose you send the same load over a rough road. There is no comparison. The mileage cost in the latter case would be more than the other mileage record.

### Can Use Ton-Mile Also

You figure your fiscal statement on a yearly basis. Why shouldn't you figure truck costs on the same basis, or on a monthly basis, or on a time basis of some kind. It doesn't make any difference what load you have after you obtain the time basis and calculate it correctly. It is very well if you care to go into the details of figuring ton-miles, etc., after figuring the day basis, but do not get away from the fact that your truck is worth a certain number of dollars per day to you. When you charge the party that you are working for a

certain number of dollars per day for the job, then you will find you will control your costs to better advantage and surely be more accurate.

Then take the system for recording stock, supplies, etc. The old way was to tell Bill Jones to get a tire and a couple of quarts of this or that, an extra belt and so on, and that was supposed to be charged to the truck. Don't guess; know facts and make your accounting system produce the figures.

### The Depreciation Item

Then there is depreciation on your equipment. That is an item of great importance in filing tax returns. No doubt you have experienced trouble in that direction. The depreciation can be recorded upon your books each month and charged to these trucking costs. This can be done through your journal and in a simple manner.

If you have a truck worth \$6,000, and depreciate it 20 per cent a year, divide that figure by twelve and you have the proportionate depreciation for each month.

Then there is another item of insurance. That can be handled in the same way. Get your yearly basis first and then calculate to a monthly basis.

Then you have your garage rental and repairs. If you spend money for repairs or anything of that kind, you receive a bill or you pay cash and charge that into some expense account. My point is to see that the expense account is distributed over the trucks where it belongs.

I know of two trucking organizations which figure their costs for moving a load. One concern quoted \$40 and the other \$65 for the same job. Both concerns said they had a cost system in operation. I saw both sets of figures. The \$65 man had his cost system tied into his books and he proved that his quotation was correct. He had a good system and a simple way of handling it. The other man simply went on guess work. A certain amount of guess work cannot be eliminated, but on the other hand, limit the guess work as much as possible.

If you figure that you should make a profit of say 30 per cent and, at the end of the fiscal year you find that you have made a profit of only 5 per cent, bad cost keeping is the reason.

A concern recently called me in for consultation and this is what I found: It made a small percentage actually. It operated in a rough way, without considering the inventory account. When the inventory was taken of the tires, tubes, wrenches, etc., there was a shrinkage of pretty close to 37½ per cent. The variation on gasoline was 24½ per cent. The pay roll, charged into the costs, varied 32½ per cent. The concern charged no depreciation on the trucks at all. The insurance was short and practically every item which went into the calculations was wrong, thereby accounting for the difference in estimated profit and actual profit.

This might happen to any of us if we do not keep accurate costs.



# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 527—Connecting Brake Rod to Pedal

**T**O connect the brake rod to the pedal after changing batteries, one end of a battery carrying strap is hooked over the rod, the strap itself placed over the pedal and the rod pushed down with the hand, the pin being pushed in with the finger.—C. D. RECORDS, Oroville, Cal.

## No. 528—Emery Stick for Vulcanizing Work

**A**N emery stick is used for roughing tires in preparing the repair. It is made by coating the stick with glue, dipping it in emery powder and allowing to dry.—H. J. GOLTERMANN, Overton, Neb.

## No. 529—Socket Wrench for Ford Commutator

**A** SOCKET to fit the coil nuts and commutator in the Ford is mounted in a wooden handle. Its use saves time over the pliers method and the nuts are not damaged.—F. M. CARLSON, Erie, Pa.

## No. 530—Tool Carrier from Old Shoe

**I**T is always a good idea to have some convenient means for carrying tools from one part of the shop to another. The time and energy method of trying to carry them in the hand is not economical. Especially is this so when the mechanic has certain jobs to perform during the day. The usual practice in progressive shops is to assign each mechanic his work for the day and then to trust to his judgment as regards the selection of tools. He may have one particular job in mind and then only select the tools necessary for that one particular piece of work. After that job is finished it will be necessary for him to go back to the tool room to select the tools for the next piece of work. In large shops this would necessitate his making out a requisition, another time consumer. Of course, in a small shop where tool equipment is only sufficient to take care of the needs of one or two men, the practice of requisitioning all of the tools for the day would not work out well. In large shops, on the other hand, tool equipment is usually sufficient to take care of excessive demand. In that case, a tool carrier such as is shown in the accompanying illustration would come in handy.

***T**O help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs:*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

This is made from a section of an old shoe, the ends being filled in and a leather strap secured to the ends for a handle. Blocks placed underneath prevent its tipping over.—P. WING, Elmira, N. Y.

## No. 531—Replacing Rear End of Ford

**I**N replacing the rear end of a Ford truck it is sometimes rather difficult to hold the universal joint male end up so as to enter it in the transmission, even though it be packed with grease.

If a piece of small wire is looped around the end of the joint it will be found possible to hold it anywhere easily with no danger of pinching the fingers.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.

## No. 532—Locating Wristpin Set Screw

**T**O locate the wristpin set screw, hold the pin tightly between two half pins held in a vise, as shown. This will prevent its turning while the screw is spotted.—J. FERGUSON, Roanoke, Va.

## No. 533—Dressing an Emery Wheel

**A**N emery wheel is dressed by holding a spark plug porcelain against it in the same manner as a wheel dresser.—J. T. WALTER, Phoenix, Ariz.

## No. 534—Rapid Chuck for Turning Lathe Collars

**S**OME parts are especially difficult to chuck centrally in the lathe for turning and require time to set them up and also require time for their removal. The fixture shown in the accompanying illustration was made to facilitate the work of setting up some circular collars for lathe turning and also to speed up the work of getting them done. The cost of the fixture was saved on the first day's work, which is accounted for by the rapidity with which the parts were machined. The fixture was made from bar stock, turned down at the end to a diameter several thousandths smaller than the collars, leaving a shoulder to set the parts up against.

The end was then drilled and tapped for a 1-in. bolt. After threading the hole the fixture was set in the power saw and three cross slots were sawed to about 2 in. below the shoulder.

When the fixture was chucked in the lathe, the collars to be turned were placed in position and a 1-in. bolt screwed in.

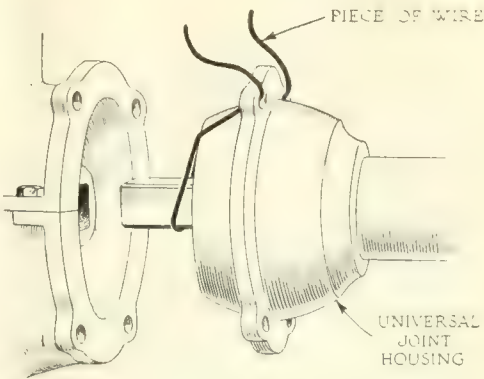
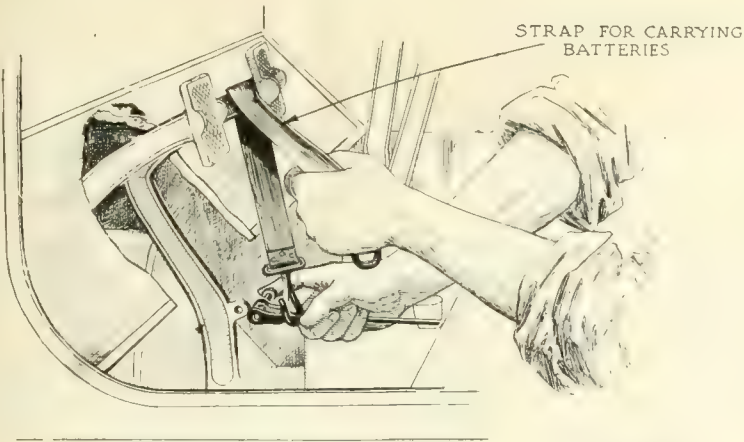
When screwed entirely in, the fixture would expand enough to grip solidly and hold the collars. When the bolt was backed off several turns the part could be removed and another substituted using only a wrench to set it ready for machining.—J. NELSON, Jacksonville, Fla.

## Insurance Plan Effective

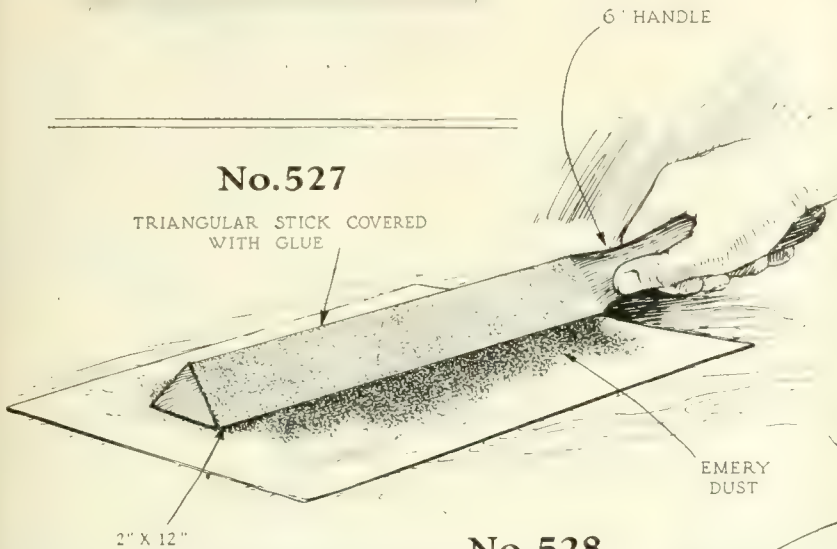
**O**VER 90 per cent of the employees of the Westinghouse Electrical and Manufacturing Co., at the East Pittsburgh works, have taken advantage of additional insurance, under the Insurance and Savings Plan recently made effective by the organization.

Every employee, when completing months' service with the company, is given a \$500 life insurance policy, free of charge and without any restriction. By continuing with the company and depositing at least 2 per cent on his earnings in the Employees' Savings Fund, additional insurance of from \$500 to \$1,500 may be secured.



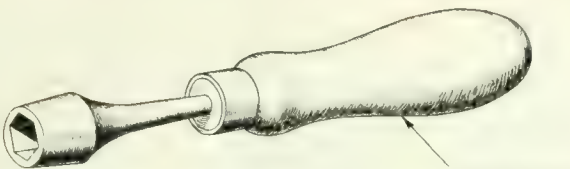


No.531

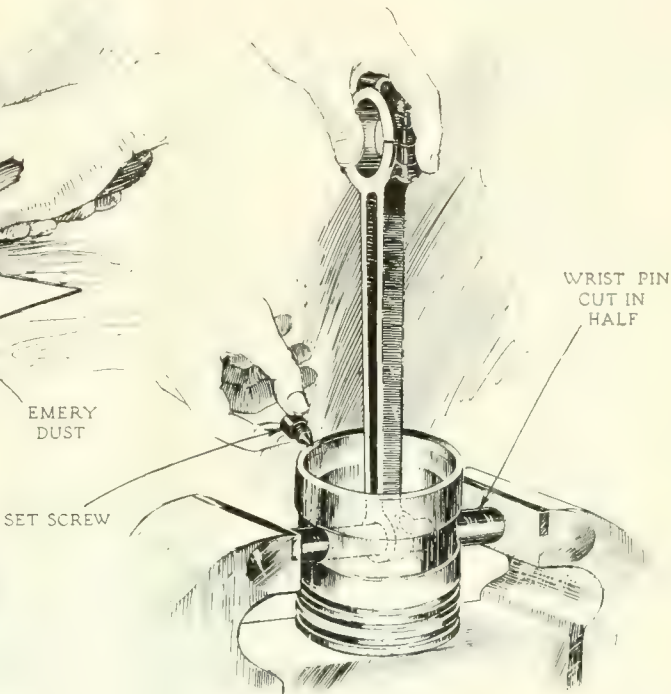


No.527

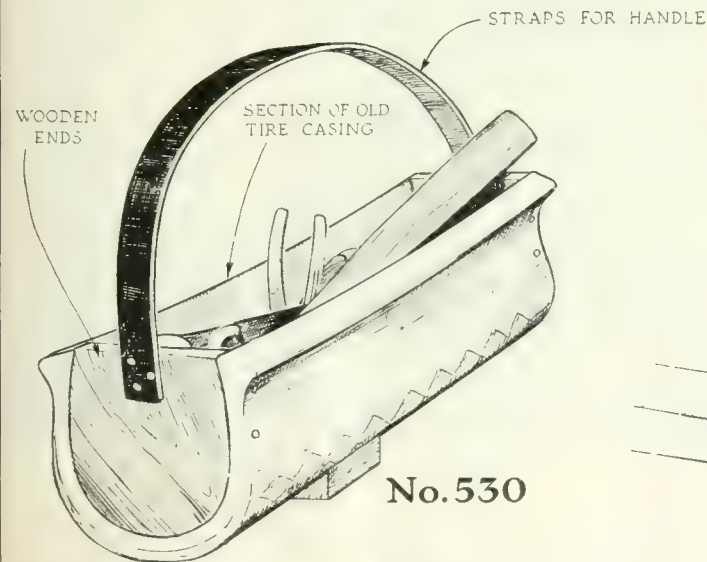
No.528



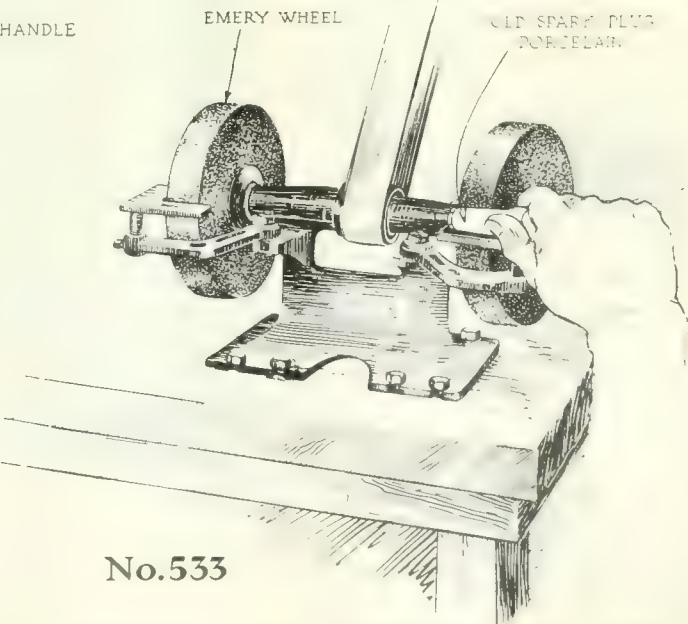
No.529



No.532



No.530



No.533

### No. 535—Tinfoil a Substitute for Fuse

**T**INFOIL from a cigarette box will be found as an able substitute during the time when emergencies require a new fuse. This can also be used to take up looseness in the rotator arm in the distributor head by being laid flat across the driving arm and pressing the rotator arm down. — W. A. KRAUS, Economy Grocery Co., Waterbury, Conn.

### No. 536—Removing Broken Screws

**F**OR removing broken screws, grease cup stems, etc., up to  $\frac{3}{8}$  in. diameter, get a standard  $\frac{5}{8}$ -in. tap with a shank of  $\frac{3}{8}$ -in. diameter. All that will be necessary to do will be to grind the end, tapering it to about  $\frac{1}{8}$  in. There is no danger of breaking the tool as all taps are made of the finest steel hardened all over, thus requiring no tempering. — W. A. KRAUS, Economy Grocery Co., Waterbury, Conn.

### No. 537—Making Split Yoke Tight With Bolt

**S**OMETIMES the threads in the split yoke and threads on the cross steering rod become worn and loose and cannot be drawn up tight with the clamp bolt. To remedy such a condition without replacing the worn parts, take the yoke and place same in a vise. Then draw the vise up tight to close the slot in the yoke. After this has been done, tape a hack saw and saw into the yoke where the old slot was. Repeat this process until enough metal has been removed to obtain a tight clamp. — WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.

### No. 538—Reamers With a Separable Shank

**T**HE best of tool steel is used in making reamers, and for reasons of economy in the use of this expensive steel a detachable type of socket will be found advantageous. Another detail that causes trouble and frequently loss when making reamers is due to tempering. Warping is the most frequent difficulty, and cracking is also experienced.

By making the socket or shank a separate part, only the broken or distorted part is a loss. An effective method of fastening the reamer to the shank consists of a round block, one end of which is cut for the insertion of a taper pin in the shank. The end of the reamer, which is threaded, is screwed into the shank with the round block in place and the pin is driven in. Driving in the pin locks the parts of the tool, yet these are as easily separated by driving out the pin. — E. RAMSEY, Detroit.

### No. 539—Removing a Check Valve Knock

**A** KNOCK in an engine which cannot be located elsewhere can sometimes be traced to the oil pump check valve.

The channel which directly follows the valve is sometimes too large and the knock is taken out by filling the channel with solder and drilling smaller. — A. CRAW, New York City.

### No. 540—Substantial Mounting for Anvil on Block

**S**OME mechanics make the mistake of trying to hold an anvil in position on the anvil block with short bolts or lag screws only to find after a short period of use that the anvil is moving about at each stroke of the hammer.

Frequent tightening does not result in holding the anvil stationary, and it is only a matter of a short time before the bolts are broken or the lag screws have to be replaced with longer ones to go down further into the wood. The cause is that the short bolts or screws are not long enough to be elastic and absorb the hammer blows transmitted through the anvil.

Or in other words, the stretch of these bolts is great enough to pull the bolt out lengthwise. Where this stretch is given a very long bolt, it will return to its shape without having been stressed beyond its elastic limit. The method of attaching the anvil, as shown in the accompanying illustration, has for its

purpose the provision of the long bolt idea and in consequence, while the anvil can move under the hammer blow or impact, it will return to its seat as the lengths of the attaching supports are not stretched permanently. If you have one of these troubles on anvils try the remedy shown and you will forget that the anvil is bolted down. — G. McDONALD, Detroit.

### No. 541—Soldering Iron Rest

**I**N order to avoid the burning of the work bench when a soldering iron is being used, it is a good plan to use a rest such as is shown in the accompanying illustration. Frequently the bench will be burnt when the bit is set down between the intervals of its use.

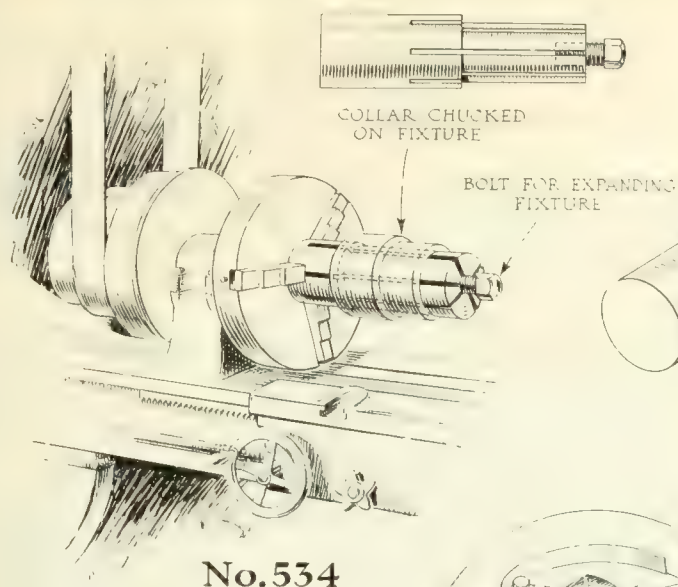
The rest is an advantage over placing the heated bit on a brick or an iron block, which rapidly carries the heat out of the tool and requires placing it into the furnace to heat before using. The rest is made simply from two pieces of sheet steel or iron and a single bolt. A strip of metal is bent to afford feet and one short strip is used as a clamp. The rest folds back against the handle when the tool is to be set in a deep furnace or forge. — E. JOHNSON, New York City.

## Hoist Body Raises Entire Load for Transferring Ice from Truck to Car

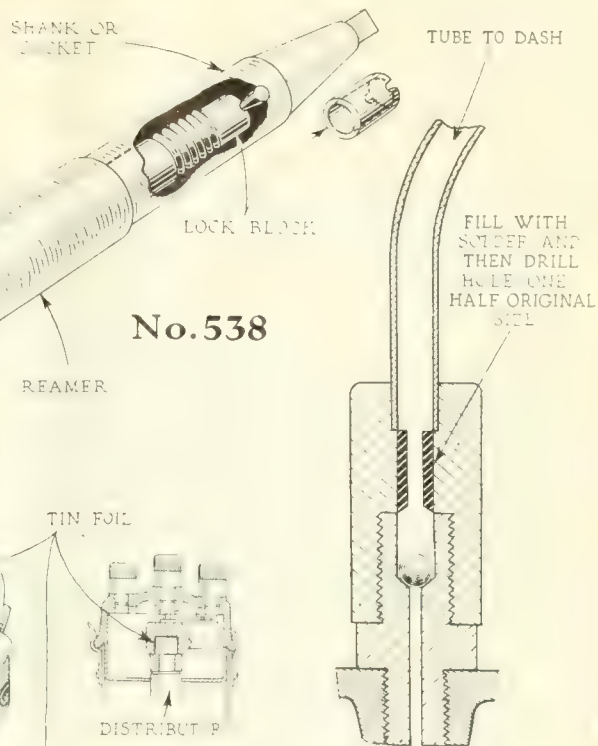


The ordinary method of using an inclined platform and pulling up the blocks of ice from the truck to the top of the refrigerator car did not appeal to this ice dealer in Pittsburgh. So he had a special body built on his truck. He thought it would be better to raise the load all at once and then slide the ice over in the manner shown above. And so it proved, for the unloading was accomplished in one-third the time required by the old method. Using the motor power, four screws raise the body to the proper level.

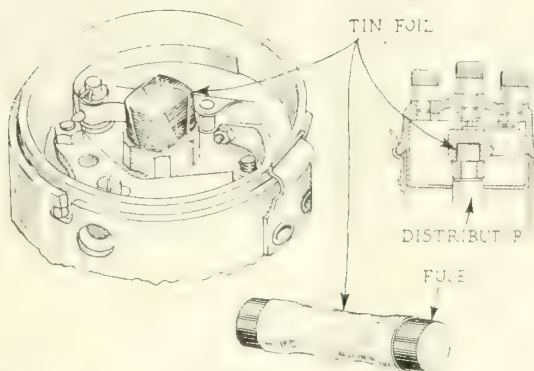




No. 534

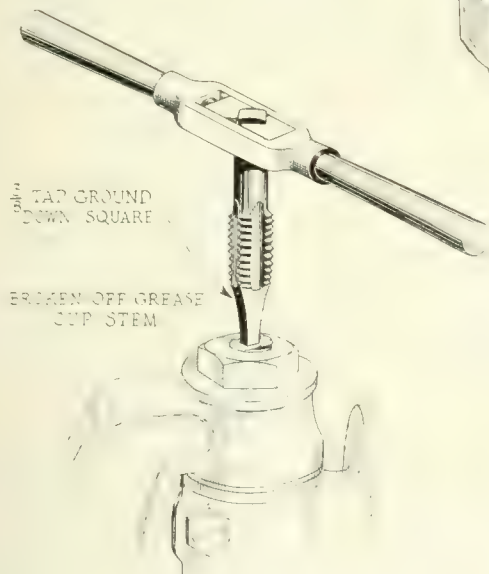


No. 538

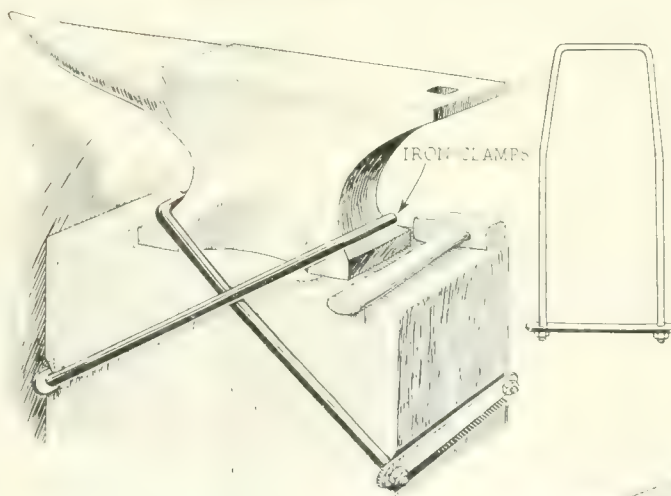


No. 535

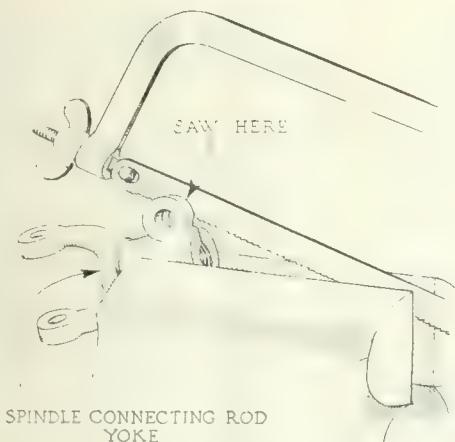
No. 539



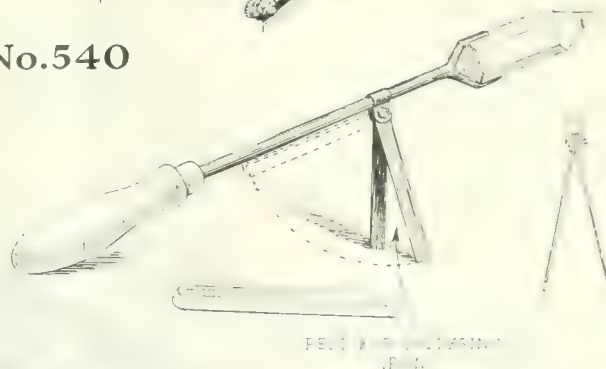
No. 536



No. 540



No. 537



No. 541

## Buyer's Department of The Commercial Vehicle

### **3/4-Ton Acason Speed Truck Sells for \$1,650**

**Has Speed of from 30 to 40 M.P.H.—  
Is Worm-Driven and Has a 110-In.  
Loading Space.**

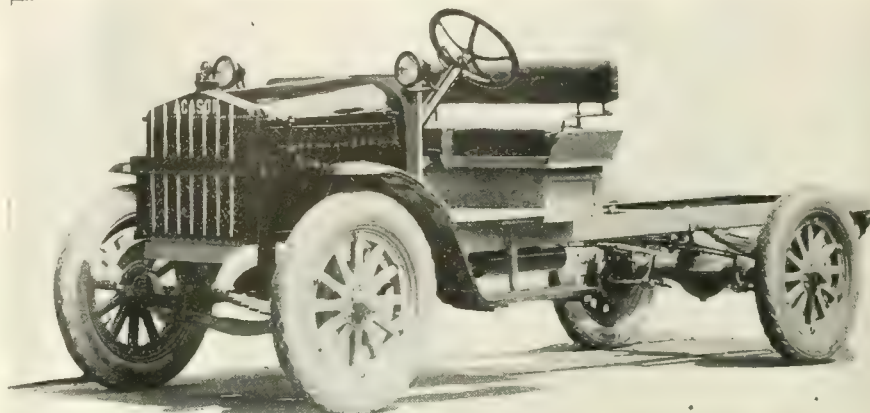
#### ACASON SPECIFICATIONS

Capacity, tons	3/4
Price	\$1,650
Wheelbase, in.	142
Tires, front	34 x 5
Tires, rear	34 x 5
Bore, in.	3 3/4
Stroke, in.	5
N. A. C. C. h.p.	35
Final drive	Worm

THE Acason Motor Truck Co. has introduced a new 3/4-ton speed truck which is rated at 30 to 40 miles per hour. This truck, which sells at \$1,650 f.o.b. Detroit, is of a light delivery type. It is unusual in this respect, however, in that it has a worm-drive rear axle and a 110 in. loading space. The engine is a four-cylinder, L-head type 3 3/4 by 5-in. bore, and stroke developing 35 hp. at normal speeds. It is equipped with Westinghouse starting and lighting and magneto ignition.

The new truck is mounted on a 142-in. wheelbase and has a standard 56-in. tread. It is built up on a 202-in. overall frame of pressed steel.

Standard units are used throughout in its construction, the engine being fitted with a Schebler carbureter, a centrifugal



*Chassis of new Acason speed truck mounted on 34 x 5 in. pneumatic tires*

flyball type governor built integrally with the engine and entirely enclosed. This governor is operated from the timing gears. The engine is cooled by a pump with a built-up type of radiator provided with a detachable core and protected by a radiator guard. The clutch is a disk type delivering the drive of a three-speed Fuller gearset. The propeller shaft is a three-joint type provided

with S. K. F. self-aligning center bearings. The axles are Timken. The springs are semi-elliptic and the wheels wood artillery type equipped with 34 by 5 in. pneumatics, front and rear. The price includes full equipment with electric lights, generator, Willard 80 hour battery, Boyce motometer, three oil lamps, mechanical horn, jack, oil can and complete set of tools.

## Lease Truck a Newcomer in the Transport Field

#### LEASE SPECIFICATIONS

Capacity, tons	1 1/2
Price	\$1,550
Wheelbase, in.	136
Tires, front	36 x 6
Tires, rear	38 x 7
Bore, in.	3 1/2
Stroke, in.	5
N.A.C.C. h.p.	19.6
Final drive	Worm

THE new 1 1/2-ton worm-driven Lease truck has been designed for general trucking purposes and farm work. The plant of the Lease Motors Co., Inc., maker of the truck, is located in Long Island City, N. Y.

The units used are all of standard design and include the following: Hydraulic Pressed Steel rigid frame;

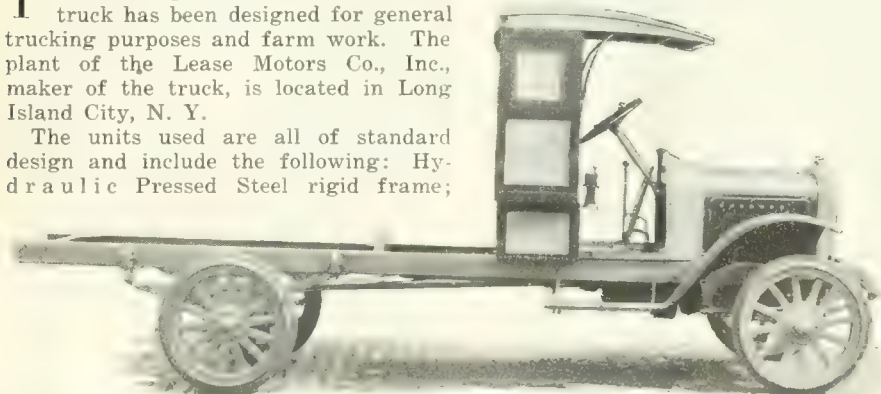
Wayne wood wheels; Herschell-Spillman four-cylinder engine; Bush radiator; Bosch high tension magneto; Stromberg gravity fed carbureter; Fuller multiple-disk-in-oil clutch and three-speed selective gearset; Ross steering gear; and Maremont springs. Tire equipment is optional.

The cylinders of the powerplant are cast in block with the valves at the right.

Water is circulated by thermo-syphon through a plain tube type of radiator. Spark control is by hand. The engine is a unit with the gearset. Both propulsion and driving torque are taken through the springs. Brakes are internal type and operate on rear wheels.

#### New Dilution Gage

CHICAGO, Aug. 2.—An instrument for determining the dilution of crankcase oil has been placed on the market by the Lubricating Appliance Mfg. Co. under the name of the Larcliff Dilutometer. It is in the form of an hydrometer on the stem of which there is a sliding tube with scale marks lettered "Danger," "Poor," "Fair" and "Good." The sleeve is set so that new oil will show "Good," and the scale mark to which the instrument submerges then indicates the degree of dilution. Tables for different oils have been worked out for the use of the operator, so that even if he has no sample of the new oil he can set the sleeve scale at the proper index point on the stem.



*The new 1 1/2-ton worm-driven Lease truck*

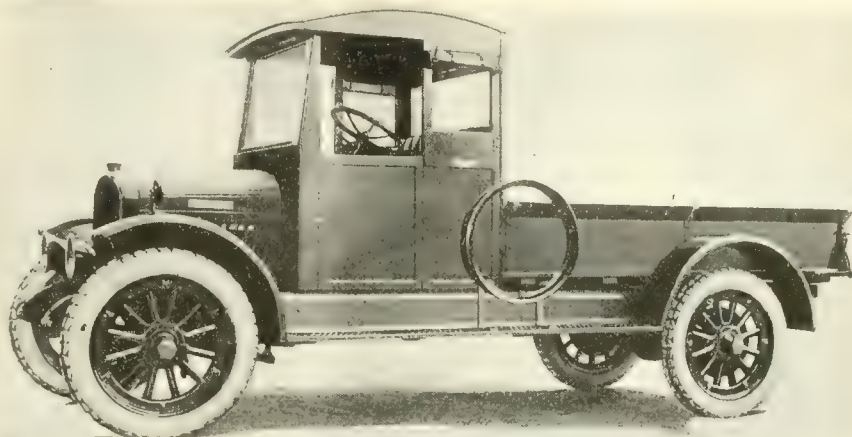


# Buyer's Department of The Commercial Vehicle

## New Brockway Truck a 3/4-Tonner

### BROCKWAY SPECIFICATIONS

Capacity, tons.....	3/4
Price.....	\$1,675
Wheelbase, in.....	135
Tires, front.....	35 x 5
Tires, rear.....	35 x 5
Bore, in.....	3 3/4
Stroke, in.....	5 1/2
N.A.C.C. h.p.....	22.5
Speed, r.p.m.....	1800
Speed, m.p.h.....	40
Gear ratio in high gear.....	4% to 1
Final drive.....	Spiral Bevel



The new 3/4-ton Brockway Highway Express

**STANDARD** equipment of the new S Model E Brockway Highway Express includes a driver's cab and windshield, flareboard express body, electric starting and lighting, electric headlights with dimmers, tail-light, horn, speedometer, one extra rim, spring bumper, complete set of tools, jack and tire pump. The truck is equipped with pneumatic tires.

The units used in its assembly are as follows: Buda four-cylinder block engine mounted as a unit with the gearset; Wayne wood wheels; Long radiator; Connecticut ignition; Dyneto generator and motor; Prest-O-Lite battery; Stromberg carburetor; Warner clutch and gearset; Columbia spiral bevel rear and Columbia front axles; Rowland springs; Lavine steering gear, and Spicer universal joints.

The body length is 8 1/2 ft. and the width is 46 in. The frame length back of the seat is 98 in.

The cylinders are cast with the valves at the right. Water is circulated by thermosyphon through a vertical finned tube type of radiator. The engine is

lubricated by a circulating-splash system. There are three main shaft bearings. The front bearing is 1 3/4 by 2 7/8 in.; the middle is 2 by 2 1/4 in.; and the rear is 2 1/2 by 3 1/4 in. Fuel is fed to the carburetor by vacuum from a tank located under the seat.

The clutch is the multiple dry-disk type and is faced with Raybestos material. The three-speed gearset is of the selective type. Drive is through a two-piece propeller shaft and three universal joints, supported in the center on a self-aligning bearing. This bearing is enclosed in an oil and dust-proof case, with ample provision for lubrication. Propulsion and driving torque are taken through the half-elliptic springs.

The hand brake is of the internal type while the foot brake is of the external type.

A high pressure lubricating system complete with gun is used for the chassis lubrication. Steering is on the left and brake and gearshift control is in the center.

## Well-Known Units in New Mutual

### MUTUAL SPECIFICATIONS

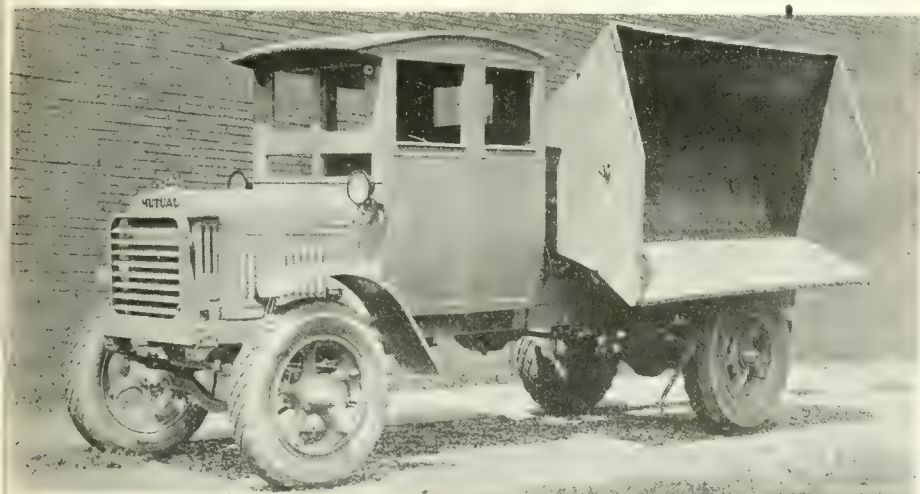
Capacity, tons.....	2
Price.....	\$3,450
Wheelbase, in.....	150
Tires, front, solid.....	36 x 4
Tires, rear, solid.....	36 x 8
Bore, in.....	4
Stroke, in.....	4
N.A.C.C. h.p.....	25.6
Final drive.....	Worm

A 2-TON model assembled from well known units is the latest addition of the Mutual Truck Co., Sullivan, Ind. Its price, \$3,450, includes electric lighting and starting, an enclosed all-steel easy-seat cab, metal wheels, Veeder hub odometer, and a radiator guard. A feature of the equipment is the 2 1/2-gal. reserve lubricating oil tank.

The units included in the assembly of this new model are as follows: Wisconsin four-cylinder engine; Sheldon worm-driven rear and Sheldon front axles; Parish & Bingham frame; Mather springs; Bosch magneto; Stromberg carburetor; Hele-Shaw clutch; Westinghouse starting and lighting system; Ross steering gear; Perfex radiator; Duplex governor; Spicer universal joints; Smith metal wheels for solid tires (standard) and Dayton metal wheels for pneumatic tires.

A four-speed gearset is used. Most of the units used are oversize. The rear axle is of a 2 1/2-ton size; the four universal joints are of the 3-ton type, and the frame is heavier than usual. The latter is 224 in. long and has a channel of 6 1-16 in. with a 3-in. flange. It is made from 1/4-in. alloy steel.

Bound Brook oilless bushings are used throughout. Electric steel castings are used at vital points.



A feature of the 2-ton Mutual truck is the 2 1/2-gal. reserve lubricating oil tank.



# Buyer's Department of The Commercial Vehicle

## Rich Vacuum Piston

THE feature of this piston is a vacuum chamber in the head. It is believed that this chamber will effectively insulate the combustion chamber heat from the crankcase and oil below. Closer fitting of pistons is also said to be possible because of this vacuum insulation. These pistons are made for all makes of truck engines. The maker is the Rich Steel Products Co., 3855 Santa Fe Avenue, Los Angeles, Cal.

## Banker Windshield

THE Banker Windshield Co., Pittsburgh, Pa., is manufacturing windshields that will fit the needs of most every truck. The model No. 11 is built either with the clear vision feature or channels across the center and division bar in the lower half, the first construction being most suitable for lighter trucks and the latter for heavier trucks where there is more chance of glass breakage.

Model No. 15 is specially constructed for cab jobs and is attached either to the cab or to  $\frac{3}{8}$  in. square standards running from the cab roof to the dash which the fleet owner furnishes. Model No. 16 is especially constructed for use on trucks where a cowl fitting is necessary to attach the shield to the truck.

## Humistat

THIS is a complete dash controlled device that vaporizes clean water and then introduces the vaporized water continually into the cylinders as an admixture to the hydrocarbon explosive mixture formed by the carburetor, thus, it is claimed, preventing and eliminating carbon troubles.

It is automatic throughout, requiring no attention other than replenishment of its water supply every 400 or 500 miles of running.

The degree to which the air is humidified is controlled by a floating air sprayer. The price with standard fittings is \$25. The maker is the Tremont Products Co., Boston.

## Corbin-Brown Speedometer for Fords

THIS is built on the centrifugal principle. Practically the entire inside mechanism of the instrument consists of two compound governors. The governors being extremely sensitive to the slightest speed variations makes it possible to register as low as 5 m.p.h. This model is calibrated up to 60 miles. Other features include the maximum speed hand and the luminous dial. With the former it is possible for the driver to keep his eyes focused on the road,

## Truck Accessories

knowing the highest speed is being accurately recorded and that it will be held until he has an opportunity of reading it at his leisure. He then can trip the hand back to zero instantly. The latter feature makes possible an easy reading of the speedometer at night. The maker is the Corbin Screw Corp., New Britain, Conn.

## M & E Universal Joints

THESE have been designed to reduce the loosening of bolts in the universal joints to a minimum. The "Griptite" disk consists of the best quality of rubber and fabric in which are imbedded six tubular steel spreaders of the form shown—one at each bolt hole—which bulge the fabric into semi-circular ridges exactly fitting the formed clamping washers.

These spreaders, imbedded in the fabric and clamped there by the action of the formed clamping washers, are in contact with the bolts and transmit to them part of the torque from the disks; and also increase, by displacement of the rubber, the density of the fabric and rubber immediately under the clamping washer—thus allowing considerably greater clamping pressure on the bolt and reducing future permanent set and consequent need of frequent tightening to a minimum. The maker is the Merchant & Evans Co., Philadelphia.

## Rempes Battery Clip

THE jaws of this clip have the teeth arranged radially. Tension is secured by means of a coil spring. The housing protects the clip from acid spray. The clip is constructed of stampings which are lead plated. The capacity is 125 amp. The price in lots of ten is 20 cents each. The maker is the G. H. Rempes Electric Co., Cleveland.

## Acme Vul-Cot Transmission Linings

A NEW lining for Ford transmissions. It is said that this lining will not slip, grab, burn or ravel. It is also claimed that these linings are impervious to oil. These linings are furnished in sets of three, complete with rivets, ready for attachment. The price per set is \$3.50. The maker is the Potter Lovell Co., Potter Brook, Pa.

## M & E Magneto Coupling

THIS coupling is made in two types, viz: "Fixed angle type" and "Adjustable angle type." The non-adjustable or fixed angle type coupling is of

conventional design consisting of a  $2\frac{3}{4}$ -in. diameter fabric disk to which are bolted two-armed spider forgings which can be furnished bored to suit any size shaft which would be used with a coupling of this size. Special tabbed locking washers are used under bolt heads as shown in the illustration, which prevent bolts from loosening in service. This coupling is recommended for driving water pumps, generators, air pumps or anything of a similar character.

The adjustable angle type coupling is used for driving magnetos and generators requiring accurate timing with the camshaft in order that the sparks occur in the cylinder at the proper moment.

The maker is the Merchant & Evans Co., Philadelphia.

## Eveready Spotlight

THIS new model of Eveready spotlight is said to have a range of 300 ft. The head is very compact, which permits its being inserted in the side pocket of a truck door. Two extra Mazda lamps for emergency are carried in the end cap container. The maker is the American Eveready Works, Long Island City, N. Y.

## Rex Spark Plug Wiring Set

A SET of four secondary cables for a Ford is included in this set. They are cut to the correct length and one end is equipped with a patented spring connection. This end attaches to the plug. The other end is equipped with an ordinary terminal which goes on the coil binding post. The maker is the Rex Ignition Mfg. Co., New York City.

## Lox-On Dust Cap

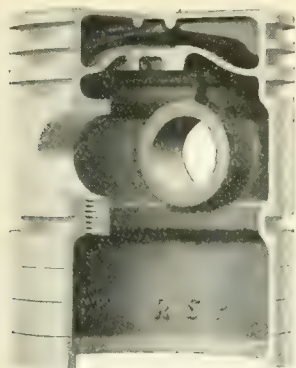
THIS dust cap is applied by being slipped over the valve stem as far as it will go. A twist of the wrist will then lock it on, creating an air-tight seal and thereby doing away with the old method of screwing down over the entire length of the valve stem anywhere from twenty-six to fifty-two complete turns. The list price is 50 cents. Model A is for the regular size valve stems, while Model B is for the Ford size. The maker is the Automatic Safety Tire Valve Corp., New York City.

## Fit-All Laminated Shim

A NEW style of laminated shim that has been designed so that it will fit nearly all shapes of bearings either as it is or with some trimming with a tinners' shears. These shims are made in different thickness and come with two different sized holes. The maker is the Laminated Shim Co., Fourteenth Street and Governor Place, Long Island City, N. Y.



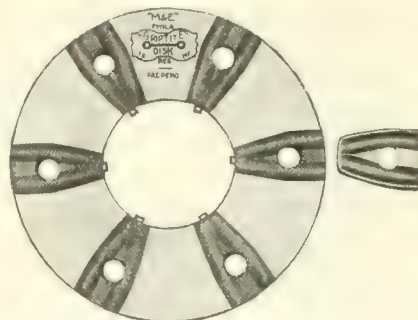
# Buyer's Department of The Commercial Vehicle



*Rich vacuum piston*



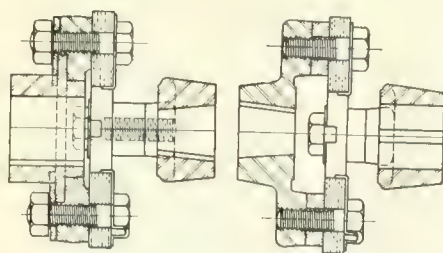
*Acme Vul-Cot Transmission Lining*



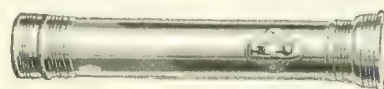
*M & E universal joint*



*Rempes battery clip*



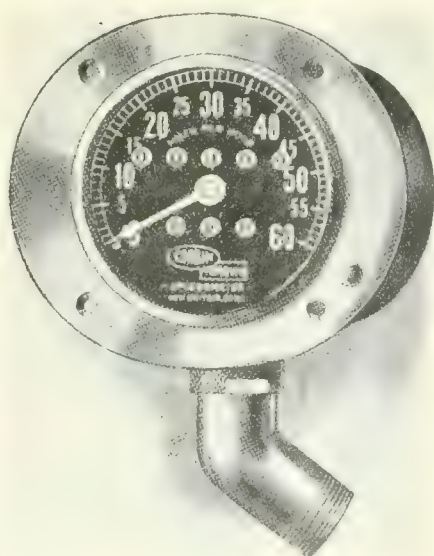
*M & E magneto coupling*



*Eveready spotlight*



*Lox-On dust cap*



*Corbin-Brown speedometer for Fords*



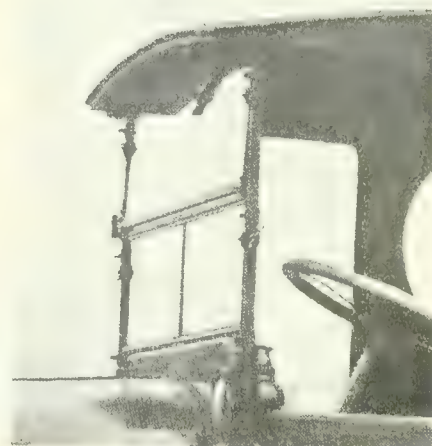
*Rex spark plug wiring*



*Humistat*



*Fit-All laminated shim*



*Banker windshield*

# Buyer's Department of The Commercial Vehicle

## Goodell-Pratt Universal Wrench

THIS wrench is so named because it is self-adjusting for any size square or hexagon nut up to  $\frac{5}{8}$  inch, and will hold round rods from  $\frac{3}{16}$  in. to  $\frac{1}{2}$  in. in diameter. The jaws are opened by pressing the trigger and automatically closed by means of a spring. By simply pressing the trigger and swinging the handle a new grip can be exerted without removing and replacing the wrench. The price is \$2.50. The maker is the Goodell-Pratt Co., Greenfield, Mass.

## "Rysco" Connecting Rod Alignment Jig

THIS has been designed for testing and aligning Ford connecting rods. The weight is 34 lbs. and the price is \$30. The maker is the Railway Specialty Co., Atchison, Kan.

## Manley Floor Level Underworker

THIS has been designed to handle any truck up to 2 tons capacity. It takes the place of the pit for working under the vehicle. It is instantly collapsible to place out of the way when not in use or to move from one position to another in the garage. It elevates the truck to any height desired so that the mechanic can work to advantage sitting in a perfectly natural position. He can see exactly what he is doing as the whole underpart of the vehicle is exposed to view, permitting him to use his speed wrenches and other tools in a perfectly natural way. The maker is the Manley Mfg. Co., York, Pa.

## Van Dresser Reboring Tool

THE design of this tool is such that true centering is obtained without the use of guide ring. Among the features are the hardened and ground feed bar without threads, a  $\frac{9}{16}$  in. bearing with lower end close to cylinder bore to secure rigidity, and a long ground upper shank on the reamer head with the feed bar. The reamer blades are made of high speed steel. The tool may be fed either by power or hand. Prices range from \$142.50 for the No. 1 which has a capacity of  $2\frac{1}{4}$  to  $3\frac{1}{8}$ , up to \$216 for the No. 7 with a capacity of from  $2\frac{3}{4}$  to  $4\frac{1}{2}$  in. The maker is the International Purchasing and Engineering Co., 506 McKerchey Bldg., Detroit.

## Manley Universal Piston Vise

THIS is instantly adjustable for the complete range of truck pistons. It is only necessary to place the piston in the vise somewhere near the center, bring up the jaws until they touch the

## Shop Equipment for Fleet Owners

piston, tighten the two cap screws, then bring up the front jaws and tighten one more cap screw.

The front jaw on the Manley vise works on an eccentric with a very small throw so that its grip is very powerful. Another feature is the large hole in the center permitting the connecting rod to pass through when it is desired only to remove or replace the rings and not disturb the rod.

It is made of cast iron finished on the top plate and on the inside and under side of the jaws so that it is perfectly square.

The range of diameters of pistons handled is from  $2\frac{11}{16}$  in. to  $5\frac{5}{16}$  in. The weight is 15 lbs. The maker is the Manley Mfg. Co., York, Pa.

## Katy Kotter Puller

THIS special tool for pulling cotter pins operates like a pair of pliers. It is made of drop-forged steel, tempered and polished. It is said to reduce the time spent in removing cotter pins very materially. The price is \$1.40. The maker is the Katy Tool Mfg. Co., Minneapolis, Minn.

## Skinner Valve Set

THIS set of tools has been designed for reseating and refacing valves. The reseating tool has four cutters and takes all valves from  $1\frac{1}{8}$ -in. up to 2 $\frac{1}{2}$ -in. Pilots are provided in four sizes:  $\frac{5}{16}$ ,  $\frac{3}{8}$ ,  $\frac{7}{16}$  and  $\frac{1}{2}$  in. The refacing tool is set to refinish a 45 deg. valve but can easily be adjusted to reface 30 and 60 deg. valves. A hand file is provided with the tool, one side of which is coarse for roughing down the valve and the other side fine for finishing. Sheets of emery cloth are included with the set for polishing. The tools may be bought separately or in combination. The price of the valve reseater is \$15. The valve refacer costs \$10. A complete set which comes in a leather case costs \$25. The maker is the M. B. Skinner Co., 558 Washington Boulevard, Chicago.

## Keystone Cylinder Reamer

THIS tool is designed to ream cylinders for all oversize pistons in the Ford and Dodge engines. It is adapted to either power or hand operation, a wrench being furnished with the outfit for use in the latter case. The reamer head is provided with ten high speed steel blades fitted in slots. The diam-

eter is adjustable from  $3\frac{3}{4}$  to  $4\frac{1}{8}$  in. The feed screw bearing is extra long and has an adjustment for taking up wear. The price is \$125. The maker is the Keystone Reamer & Tool Co., Milersburg, Pa.

## Phoenix Cylinder Reboring Machine

THIS machine rebores all makes of cylinder blocks. It may be operated either by hand or power. The boring bar is accurately held to the center by a  $1\frac{1}{2}$ -in. adjustable bearing. One cutter head is furnished with each machine, which will rebores from  $3\frac{3}{8}$  in. to  $4\frac{1}{4}$  in. With an extra set of cutting tools this tool will bore up to 5 in. diameter. A special head is furnished for cylinders from 2 $\frac{5}{8}$  in. to 3 $\frac{3}{8}$  in. The price is \$200. The maker is the Phoenix Mfg. Co., Eau Claire, Wis.

## Hot Baby Torch

AN oxy-acetylene decarbonizing, lead burning, cutting and welding torch has been placed on the market by the B. E. Hicken Sod-Tor-Lite Co., Prairie Hill, Mo. The valves which control the supply of acetylene and oxygen are mounted on the torch, where they are easily controlled by the operator. It is furnished with one lead burning tip, one cutting tip, four welding tips, one decarbonizing tip, and one cutter replacement plug. The price is \$30.

## New Britain Expansion Reamers

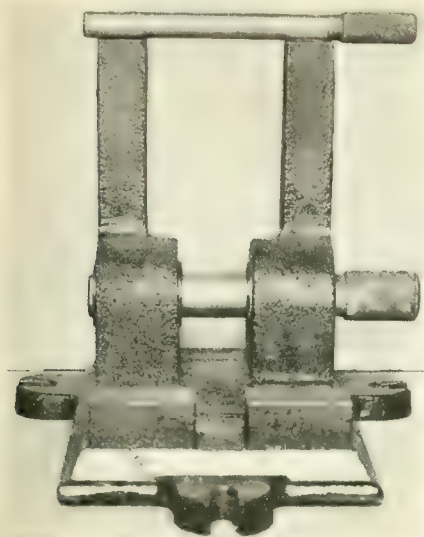
THESE tools are manufactured in seventeen sizes and will accurately ream any size hole from  $15/32$  to  $4\frac{1}{16}$  in. The expansion of each reamer is from .010 to .020 in. over the listed maximum size, which permits grinding the blades many times. The six blades are made of either tool or high-speed steel and are staggered to eliminate chattering. The smallest size reams holes from  $15/32$  to  $17/32$  in. and the largest size from  $3\frac{1}{2}$  to  $4\frac{1}{16}$  in. These reamers may be fitted with pilots, which makes it possible to accurately align two bearings a distance. The maker is the New Britain Tool & Mfg. Co., New Britain, Conn.

## Carbon Pick

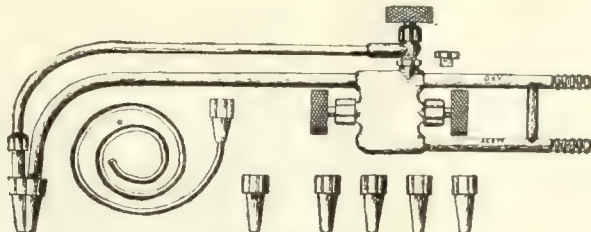
THIS tool is designed for cleaning spark plugs, and is small enough to carry on a key ring. The larger end is used for scraping carbon, and the smaller end for a thickness gage. It also provides a small file. The price for one is 10 cents. The maker is the Globe Tool & Mfg. Co., 2635 Stephenson Avenue, Los Angeles, Cal.



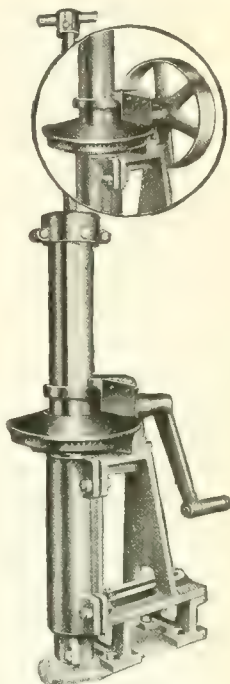
Buyer's Department of The Commercial Vehicle



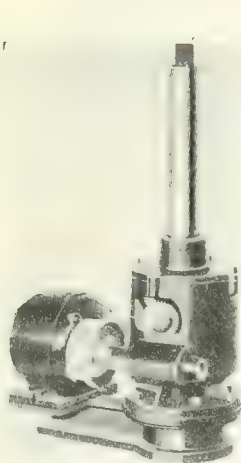
*"Rysco" Alignment Jig*



*Hot Baby Torch*



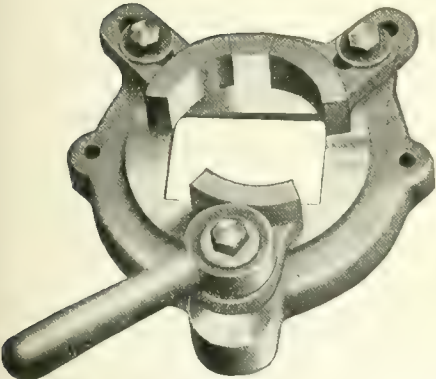
*Phoenix Cylinder Reboring Machine*



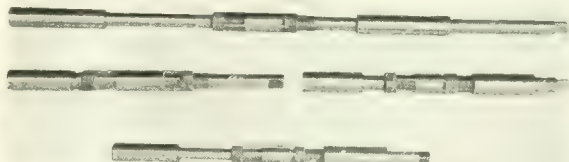
*Van Dresser Rebor-ing Tool with Elec-tric Drive*



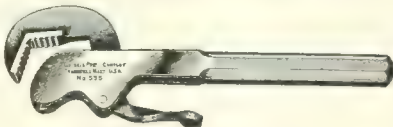
*Keystone Cylinder Reamer*



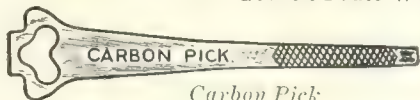
*Manley Piston Vise*



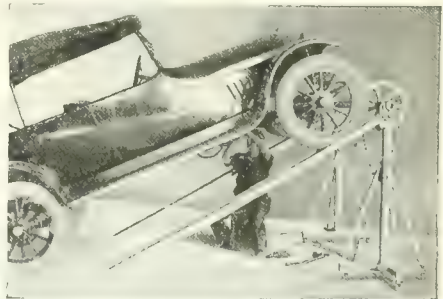
*New Britain Expansion Reamer*



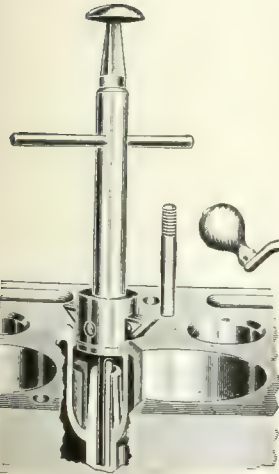
*Goodell-Pratt Wrench*



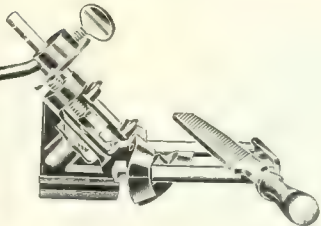
*Carbon Pick*



*Manley Floor Level Underworker*



*Skinner Valve Set.*



*Katy Kotter Puller*

# Buyer's Department of The Commercial Vehicle

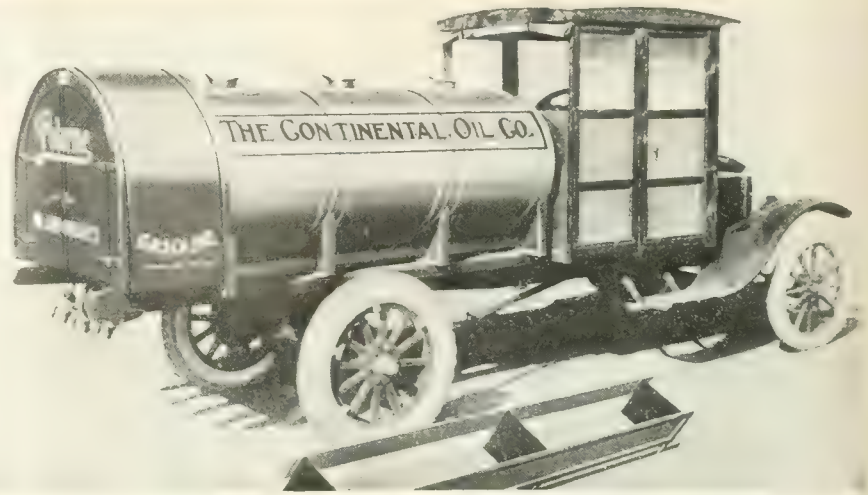
## Tank Body for Ford

### Light Weight and Absence of Twisting Strains Feature Columbian Body

**L**IGHT weight and the absence of all twisting strains are features of the Columbian partition mounted three-point supported truck tanks. By use of the partition mounting from 200 to 2000 lbs. deadweight is eliminated. The chief purpose of the three-point support is to give flexibility—to absorb all twisting strains resulting from the non-synchronous rising and falling of the wheels over rough highways.

The three-point support is not essential on tanks mounted on Ford trucks, because the three-point principle is built in the Ford chassis. The frame is trunnioned on the transverse spring at one central point at the rear and one at the front. The frame practically pivots on these points. Shocks, caused by any one wheel striking a bump or hole, do not twist the frame nor the tank mounted on it as is the case where springs are attached to the four corners of the frame. In the case of the Columbian tank mounting on Fords oak sills are attached to the bottom of the extended partitions of tanks. They are attached in a non-parallel position with the rear ends wider apart than the front ends in order to bear on the two wide points at the rear and on the two closer points back of the seat. This gives a modified three-point support, which with the three-point mounting of the chassis on the transverse springs obtains ample flexibility for the maximum load this light truck can carry.

The three compartment tank shown in the accompanying illustration has a capacity of 300 gal. As in all other sizes of Columbian tanks, equipment includes jointless pipe lines with funnel outlets.



*The Continental tank body for Fords has a capacity of 300 gal.*

Other equipment includes welded-on bucket boxes with removable bottoms, removable and adjustable side carrying racks, combination filler plug and vent and emergency valves and manholes.

The Columbian Steel Tank Co., Kansas City, Mo. has solved the weight question in tank haulage by autogenous welding. The heads and partitions are the reinforcing factors which give the tank its strength. By eliminating the use of sills, band irons, etc., considerable weight has been reduced. The height of the tank mounting has been also reduced several inches. Crystallization, caused by friction between the tank body, sillings and band irons has also been eliminated.

### Continental Commercial Bodies

**A**LL sills and bolsters used in the construction of Continental commercial bodies for Fords are made of thoroughly seasoned hardwood. Side panels are rigidly braced by heavy iron forg-

ings. Flareboards are protected by steel strips. The drop end tailgates are extra heavy and well-ironed with three steel forged hinges and furnished with chains.

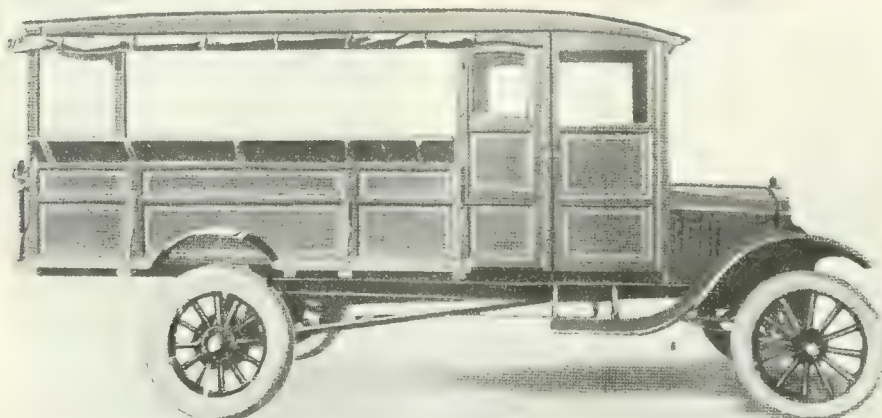
The Continental Car Co. of America, Louisville, Ky., is producing a complete line of Ford commercial bodies suitable for most transportation needs in the short distance haulage of merchandise. This line includes open and closed express bodies with cabs; open and closed high panel express bodies; high top furniture body; bus body; combination body on which can be mounted either express sides, stake racks, or cattle racks; universal stake body suitable for heavy drayage; grain body, etc. The company also manufactures closed cabs.

The side panels on the express bodies are of thoroughly seasoned selected wood, well ironed. The panel bodies are built of either metal or vehisote, as ordered. The metal panels are 20-gage stretcher leveled automobile body sheets. Vehisote is water and weather-proof.

The tops are supported by slats and ribs of first quality lumber and are covered with canvas oiled duck.

All cushions and lazy-backs are well upholstered of imitation leather. Roll-up curtains are of oiled duck. The undercoating is of linseed oil and lead, which is followed up by color, rubbing and finishing varnish. Eight separate and distinct painting operations are applied.

The side windows in the cabs can be opened and the door on the closed cab is hinged and can be quickly removed. The company offers the choice of a single ventilating or double ventilating windshield. In the case of the single type, the upper glass swings outward. The lower glass is stationary. The upper and lower sections swing both ways and lock in any desired position on the double type.

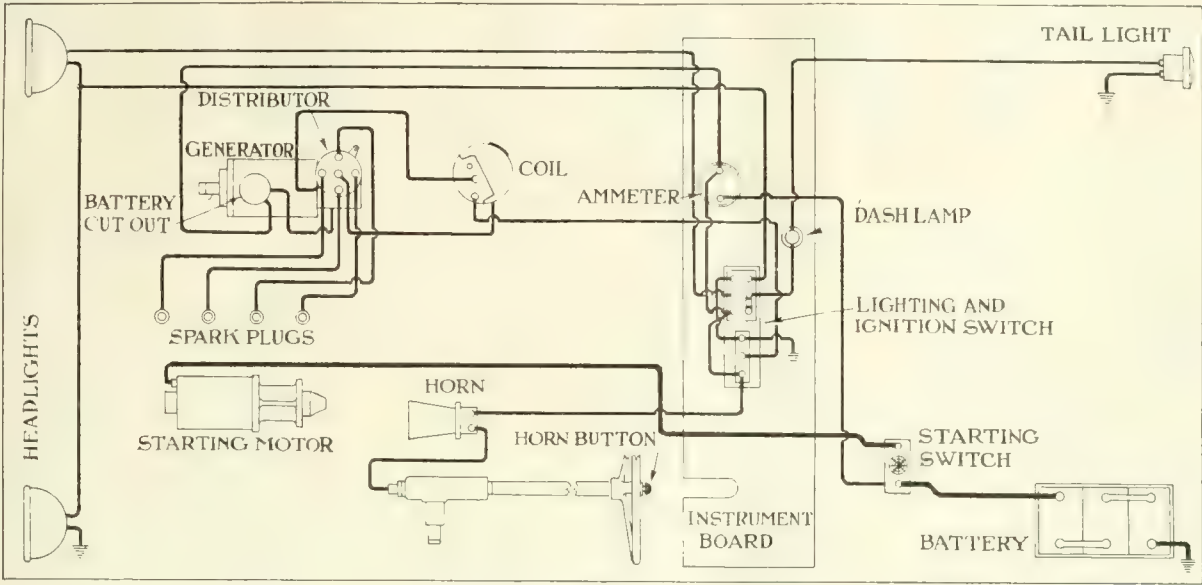


*High panelled closed express body model made by Continental company*



# Motor Truck Electric System Wiring Diagrams

## 32—Starting and Lighting Unit on Watson Trucks



Wiring diagram of the starting and lighting system used on the Watson trucks. The equipment consists of a Dyneto generator and starting motor and a Connecticut distributor

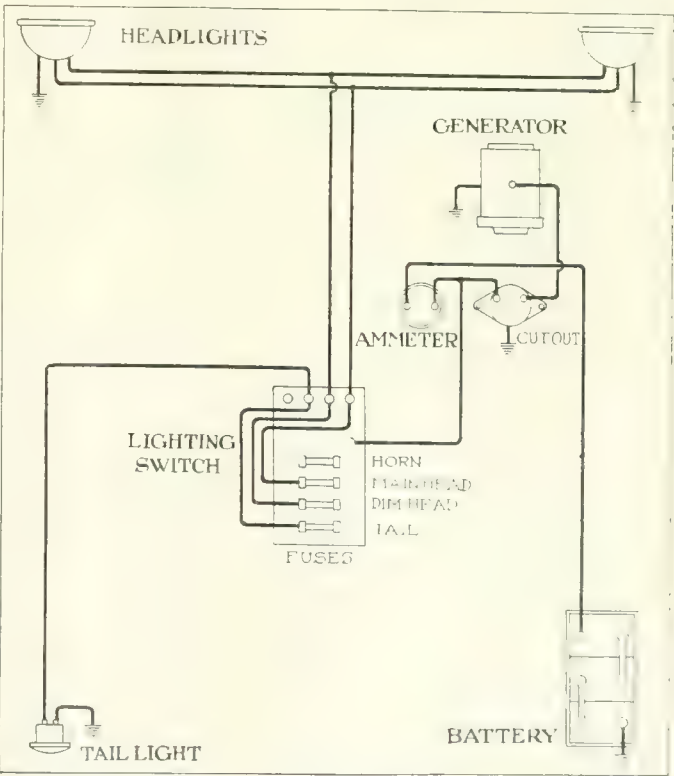
### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE:

1920	
1—Ford, Starting and Lighting	Oct. 1
2—Acme, Lighting	Oct. 15
3—Bethlehem, Starting and Lighting	Oct. 15
4—Atterbury, Lighting	Nov. 1
5—Ace, Starting and Lighting	Nov. 1
6—Atlas, Starting and Lighting	Nov. 15
7—Briscoe, Starting and Lighting	Nov. 15
8—Defiance, Starting and Lighting	Dec. 1
9—Commerce, Starting and Lighting	Dec. 1
10—Grant, Starting and Lighting	Dec. 15
11—Brockway, Starting	Dec. 15
1921	
12—Maxwell, Lighting	Jan. 15
13—International, Starting and Lighting	Feb. 1
14—Mack, Starting and Lighting	Feb. 15
15—Vim, Starting and Lighting	Mar. 1
16—Oldsmobile, Starting and Lighting	Mar. 15
17—Reo, Starting and Lighting	Apr. 1
18—Sterling, Starting and Lighting	Apr. 15
19—Stewart, Starting and Lighting	May 1
20—Kelly-Springfield, Starting and Lighting	May 15
21—Riker, Starting and Lighting	May 15
22—U. S. Starting and Lighting	June 1
23—Wilcox, Lighting	June 1
24—Pierce-Arrow, Starting and Lighting	June 15
25—Republic, Starting and Lighting	June 15
26—Parker, Starting and Lighting	July 1
27—Noble, Starting and Lighting	July 1
28—Oneida, Starting and Lighting	July 15
29—Oshkosh, Starting and Lighting	July 15
30—Knox, Starting and Lighting	Aug. 1
31—Master, Lighting	Aug. 1
32—Watson, Starting and Lighting	Aug. 15
33—Service, Lighting	Aug. 15

## 33—Lighting Unit on Service Trucks



Wiring diagram for the installation of the Westinghouse lighting equipment on Service trucks



# The Fleet Owners' Forum

## Wants Pneumatic Tire Bonus System for Drivers

To the Editor, COMMERCIAL VEHICLE:

Do you know of any tire bonus system for truck drivers? The bonus should be paid the driver who gets above a certain mileage maximum of his pneumatics.—K. ANDERSEN.

We do not know of any fleet owner that has put into practice a bonus system such as you speak of. We do, however, know of one company that contemplated one and then decided to discard it because it was impractical. Here is the plan:

The drivers were to be paid \$5 when the mileage on pneumatics had reached the 8000-mile mark. If a 9000-mile mark was reached they would be paid \$10 and for every 1000 miles above the 9000 mark they were to be given \$3.50 for each thousand miles.

One of the officials of the company stated that this plan was obviously unfair to those drivers who were limited to 40-mile routes a day when other drivers were given, for instance, 100-mile routes. This official also stated that he knew of instances where the drivers, because of eagerness to attain a big mileage, jacked the front wheels up and by turning them increased their mileage considerably.

The only practical way to our knowledge of increasing the mileage is by keeping continually after the drivers, seeing that they report all cuts in the tires, underinflation, etc. This could be accomplished through daily report cards which should be filled out by the drivers.

The Liquid Carbonic Co., Chicago, keeps track of its trucks, tires, etc., by a record which is based on accurately filled in daily service cards and frequent inspections. If anything goes wrong a concise report on the facts is turned in. A corresponding notation is then made in the record book.

Its system of rewarding the drivers is based on demerits. If a driver has no demerits for the bonus period of 2 mos., his record is 100 per cent. This means that he receives an additional 10 per cent on the average salary paid all drivers during the period in question.

The reason for figuring the bonus on the average salary is as follows: The drivers are paid the regular union scale, which is \$32 for a 1-ton truck, \$33.50 for a 2-ton truck, \$35 for a 3-ton truck, and \$37.50 for a 5-ton truck. But the company believes that a driver should get his bonus for being the right kind of a man on the job, and that the driver of a 1-ton truck and the driver of a 5-ton

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

truck should have the same chance at the bonus. Accordingly, in figuring the drivers' bonuses, all the wages due the drivers, including overtime, are added together and divided by the number of drivers. A 100 per cent bonus would then be 10 per cent of this amount.

Tire inflation and excessive tire wear are included under separate heads, the former under the "Condition of Truck" and the latter under the "General Efficiency" head. We would advise you to read the full account of this system which appeared on pages 2 and 3 of the Aug. 1, 1920 issue of THE COMMERCIAL VEHICLE.

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

## Engine Vibrates at Any Speed—Crankshaft May Be Sprung

To the Editor, COMMERCIAL VEHICLE:

My engine has a tendency to vibrate at any speed and to loosen the connecting rod bearings or burn them out at every 100 or 150 miles of running. State reasons for these conditions.—F. D. B., Corsica, S. D.

The crankshaft of your engine is either somewhat badly sprung or the bearings are worn out of round. Your thrust bearings may be so badly worn that the shaft floats excessively from front to back and vice versa.

Any one or all of these conditions would give rise to the trouble you mention. We suggest that you have the shaft removed and swung between centers in a lathe. Check for alignment of the main bearings and also their and the crank bearings' roundness. If the shaft is sprung it must be straightened. If the bearings are out of round they must be turned to true.

## Calculation of Engine Bearing Dimensions

To the Editor, COMMERCIAL VEHICLE:

For an engine of the internal combustion type, what per cent of bearing surface do you consider the most practical both in theory and in practice for the main and connecting rod bearings?—H. A. M., Tulsa, Okla.

It is impossible to state the amount of bearing surface required for main and connecting rod bearings on a percentage basis. The bearing surface required depends upon the bore and stroke of the engine, the number of cylinders, the number of main bearings, the diameter of the bearings, etc. To make this plain, let us assume two four-cylinder engines, one with only two main bearings and the other with five. The shaft of the former would be supported only at the ends, whereas the latter would be supported at both sides of each throw. The former would naturally have to be made considerably larger in diameter, owing to the greater bending strains on it. As a rough rule, for four and six cylinder engines with not more than two throws between supports, the crankpins and main bearings can be made of a diameter equal to one-half the cylinder bore, the crankpins of a length equal to one and one-quarter the diameter, the front and intermediate main bearing of a length equal to one and one-half times the diameter, and the length of the bearing at the flywheel 1 in. longer than this.

## Heat of an Engine at Explosion Stroke

To the Editor, COMMERCIAL VEHICLE:

I would appreciate your answering the following questions:

a—What is the heat of an engine at the explosion stroke and how high does it ever become?

b—Does the heat vary in different bore and stroke engines and does the r.p.m. have any bearing on the heat units?

c—What is the cooling effect on an engine with the intake stroke?

d—How hot and cool does an engine become while under working conditions?—J. DUNLAP, Detroit.

a—The heat value of 1 lb. of gasoline is approximately 19,000 British thermal units. After the ignition of a charge of fuel in a cylinder, the products of combustion are nitrogen, carbon dioxide, and water vapor, and if we consider the proportion in which these gases are present and the specific heat of each at constant volume, the total specific heat of



the products of combustion will be about 0.20. Now if we assume the mixture to be in the proportion of one part of fuel to twenty parts of air, the approximate temperature due to combustion of the fuel will be

$$\frac{19,000}{21 \times .20} = 4500 \text{ deg. Fahr.}$$

In actual practice however, this value seldom exceeds 3000 deg. Fahr., as the exposed cylinder wall area acts as a damper on the use of temperature by absorbing heat. The chemical action which takes place due to combustion also absorbs heat energy and aids in checking the initial temperature. This latter theory is known as after-burning mixture.

b—The heat would vary in this respect, that is, the amount of wall area exposed would probably influence the temperature slightly but not to any great extent. The greater the volume of the fuel charge the greater the heat absorption due to chemical action. These considerations are both small and practically infinite.

c—It is safe to say that the inlet fuel temperature does not exceed 100 deg. Fahr., while the temperature of the spent gas through the exhaust is about 1000 deg. Fahr. Thus the average temperature of the combustion chamber is undoubtedly close to the latter value.

d—This depends upon the specific gravity of the fuel, the temperature of the surrounding air, and the character of the load. It will be found very difficult to warm up an engine burning gasoline on a cold winter day when the truck is running on a good road and the engine has practically no load imposed on it. While if a heavy load is imposed on the engine, other conditions being the same, it will maintain its best operating temperature much easier. An engine burning kerosene will have a higher operating temperature than one using gasoline.

## Excessive Side Motion of Connecting Rod

To the Editor, COMMERCIAL VEHICLE:

Will side play in the connecting rod cause knocks if play is enough to allow the top end of the rod to strike the side of the piston?—W. H., Ansley, Neb.

The striking of the top of the connecting rod on the side of the piston should not, of itself, cause a knock. It is more than likely that the condition which causes this excessive side play is also causing the knock. Theoretically all parts, crankshaft, pistons, etc., should be held in such perfectly rigid alignment that the center of the rod will coincide with that of the piston. This, like all ideal conditions is difficult of realization, a close approach to it is the best that can be hoped for; this, for the reason that as the crankshaft wears, some end motion will be developed.

So long as this is not excessive it may be disregarded, but when it becomes so great as to cause all of the connecting rods to move fore and aft of the engine to such an extent that their upper end strikes the side of the pistons it is time

to have it remedied. In your case we suspect that the crankshaft thrust bearing has become so badly worn that the whole shaft, and with it the connecting rods, are floating fore and aft to an excessive degree. We would advise that the crankshaft be examined for end motion and the thrust bearings replaced.

## Pneumatic vs. Solid Tires in Road Construction Work

To the Editor, COMMERCIAL VEHICLE:

We have seen statements in some of the trade papers to the effect that pneumatic tired trucks are more suitable for road construction than are those provided with solid or cushion tires. These statements are doubtless made under the belief that a pneumatic tire will not sink so deep into a soft or uncompleted road surface as will a solid tire.

This assumption, however, we believe to be a mistaken idea. Of course, the rounded contour of the pneumatic tire may be said to "hold in reserve" addi-

there would be even a greater difference in these figures were a resilient semi-solid or cushion type of tire to be considered.

Inasmuch as the tendency to cut ruts, to pack the ground, and otherwise to destroy road beds in the process of construction, is based largely on the concentration of weight over a small area, it seems evident that the pneumatic tire, when properly inflated, must damage newly-made roads more than is generally supposed, due to the greater weight per square inch of road contact, and conversely to the smaller area of supporting surface which it presents to the road.

We would like to see this subject more fully discussed.—H. W. SLAUSON, Engineering Service Manager, Kelly-Springfield Tire Co., New York City.

## Reasons for Hanging Semi-Elliptic Springs Off Center

To the Editor, COMMERCIAL VEHICLE:

Why is a semi-elliptic spring usually hung off center? What is the reason for not placing the center bolt exactly in the center of the spring?—C. BARNES, Tacoma, Wash.

Semi-elliptic springs are hung off center because of the shock absorbing effect which is afforded within the spring itself. The period of movement in one spring is faster than in the other.

Take as an example a long spring board and a short spring board. Jumping up and down on the long spring board gives slow, smooth strokes, while jumping up and down on the short spring board gives short and more rigid strokes.

The long end of the spring has a slower action than the short end. Here is what happens: When the truck encounters an obstruction the jolt is of course transmitted to the spring. The long end is easier to bend than the short end. Therefore the short end is constantly pulling against the long end, affording a cushioning effect and lessening the rebound. It is this difference in the period of vibration and the consequences of one end of the spring pulling against the other, that is the reason for the construction.

## Number of Electric Trucks in New York City

To the Editor, COMMERCIAL VEHICLE:

Approximately how many electric trucks are running in New York City?—READER.

According to figures given by the National Electric Light Assn., there were 4,362 electric trucks in New York City, Jan. 1, 1921.

## Taxes Paid by Motor Vehicle Owners

To the Editor, COMMERCIAL VEHICLE:

In your estimation what is the total tax paid yearly by motor vehicle owners? I would also like to know what figures you have on the total tonnage carried by motor trucks annually.—C. L. BLACK, Denver, Colo.

According to the National Automobile

## Tire Bonus System

READ the letter on page 32 in regard to a bonus for pneumatic tire efficiency.

What are your views on the subject? Do you believe it is possible to better pneumatic tire mileage by offering a bonus to the drivers for mileages above a certain maximum? Or do you rely on strict inspection?

tional side wall space which will come into contact with the supporting surface as the wheel sinks deeper into the mud, sand, crushed stone or whatever other material may be encountered.

But let us consider the actual facts attendant upon the use of the largest sized pneumatic tire and solid or cushion tire. The 12-in. pneumatic tire, which is not as yet a commercial success, but which has been produced in limited quantities, must carry an inflation pressure of 140 lbs. per square inch. This means that 140 lbs. is applied to each square inch of contact surface between road and tire. If the tire is carrying its normal capacity of 8,500 lbs. of load, the area of road contact will be 61 sq. in.

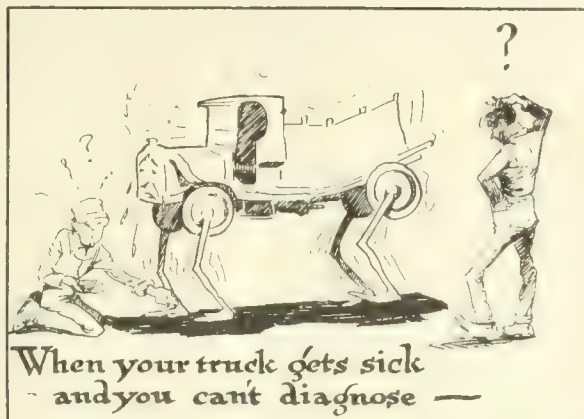
The above figures apply to a 5- or 6-ton truck and in this case, the pneumatic tire will be carrying the limit of its capacity. If we consider the solid or cushion type of tire for a 5- to 7½-ton truck, we find that the weight per square inch of road contact is considerably less. Mr. Fenner, of the International Motor Co., made tests on a 7½-ton Mack truck, fully loaded, in which it was developed that non-resilient solid tires carried a weight per square inch of road contact of but 105 lbs. This indicates that even in the case of a heavier truck, the load is better distributed with the solid tire than with a properly inflated pneumatic. On the basis of the same wheel load, the area of road contact would be 81 sq. in. for the solid as against 61 sq. in. for the pneumatic. It is obvious that





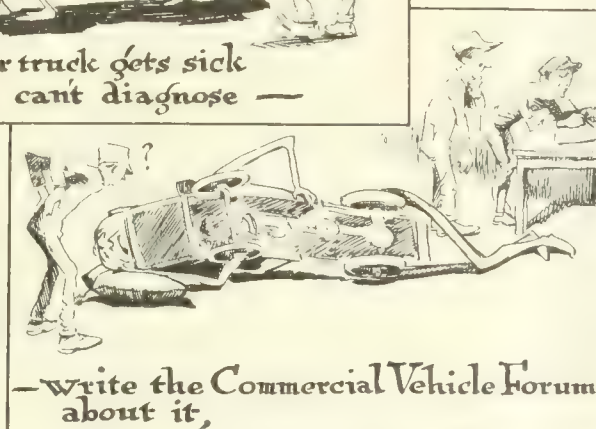


# Let Us Help Solve Your Problems!



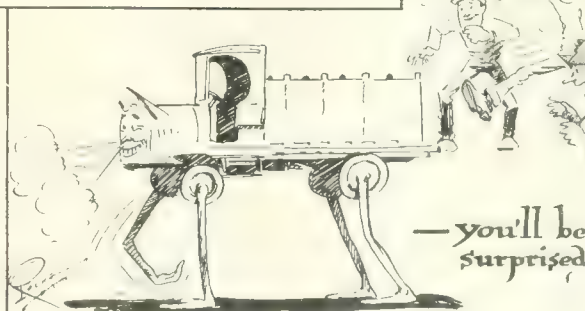
*The FORUM Department*  
of  
**THE**  
**COMMERCIAL VEHICLE**

Will Tell You What  
To Do—



*Why Not  
Use It?*

*If You Are Puzzled  
by Any Problem  
of Installation,  
Operation or Maintenance,  
Write to the Editor and  
Your Question Will Be  
Answered in the FORUM!*



**THE COMMERCIAL VEHICLE**

239 WEST 39th STREET

NEW YORK CITY



## The Association Idea!

A GREAT campaign has been started recently by the Motor Truck Association of Philadelphia. The object of the campaign is to secure every truck owner and dealer throughout the State as a member of the organization.

There is a big membership roll of owners, but the association has nevertheless been considered rather as a dealer organization.

But in this campaign a special effort is to be made to include all owners.

It is the thought of the organization to combine with the Motor Truck Association of Pittsburgh, so that there will be two big allied associations, one at each end of the State, which will work together in close harmony in legislative and in other matters.

The Pittsburgh association will aid in the membership campaign, working along the same lines as the Philadelphia organization.

It is clear from this campaign that the truck owner is coming into his own. Backward as the average truck owner has been in the past in furthering the association idea, he is so powerful in the aggregate that he is recognized as a great potential force, even without effort on his part.

How much more power could he wield—how many grievances and injustices and false economies could he adjust—if he would seize the power lying at his hand and, through the association idea, wield it for the betterment of the industry?

The Philadelphia organization has already mailed the first of three form letters it will use in the campaign. There are 16,000 of each to be mailed.

The first letter, addressed to fleet owners, points out that each owner should, in self-protection, become a member of the Motor Truck Association of Philadelphia. It cites, as proof, the fact that but for the efforts of the association, during the last session of the Legislature, license fees for trucks would have been increased about 200 per cent.

The association spent thousands of dollars in advertising and sending postal cards to every motor truck owner in Pennsylvania, urging them to protest against the proposed enormous increase in truck license fees. If the association at that time had possessed a larger membership, it is regarded as likely that it would have been able to prevent any increase in license fees whatsoever.

The association, which is nine years old, was instrumental in 1917 in preventing any change in the automobile laws—changes which would have been for the worse.

Again, in 1919, the association prevented the huge increase in license fees then proposed.

An application blank for membership will accompany form letter number one.

Form letter number two will be mailed to the same list of 16,000 fleet owners. It will enumerate the benefits to fleet owners of joining the organization. It will contain, in addition to the application blank, a folder setting forth in some detail for what the Motor Truck Association of Philadelphia stands. This was to go out Aug. 7.

The third form letter, to be sent to the same list, will summarize the substance of the previous letters and make an especially strong appeal. This will be issued on Aug. 16.

The Pittsburgh Association, beginning in September, will send out three similar form letters.

It has been shown again and again, in the history of the industry, that organization is imperative, if truck owners are to obtain any sort of justice at the hands of legislators and the public.

The association idea is undoubtedly the best—the only practicable—form of organization open to men in widely scattered businesses of many kinds.

But still such associations as have been formed are fighting an uphill fight to obtain members—and still many fleet owners are blind to their own interests, or, if not that, are sitting back and “letting George do it.”

The plan of the Philadelphia and Pittsburgh organizations is a good one. There is a lesson in it for other associations struggling against the same indifference. But there is a bigger lesson in it for fleet owners. Why should it be necessary for an organization to spend thousands of dollars—which could be far better expended in association work—to persuade reluctant truck owners to stand together and fight for their rights?

Wake up, fleet owners! You have the fleets, you have the men, you have the money, too. Organize, stand together, and get your rights—through the association idea!



## New England States Check Up Loads

### Maine, New Hampshire and Mass. Start Simultaneous Action Against Overloading

BOSTON, Aug. 9.—The simultaneous action by Maine, New Hampshire and Massachusetts to check up the use of the highways by heavy trucks leaves an impression that there is an "Ace in the hole" somewhere.

Maine started by putting inspectors on her highways to check up truck drivers, under the law passed early in the year limiting weight loads to 18,000 lbs. These inspectors held up a number of vehicles, mostly from Massachusetts and warned them that they could not operate in Maine without being brought to court, if they overloaded their vehicles. Some of the owners of these vehicles stated that they would not carry through freight if they were thus restricted. They could not make money on long hauls unless they carried a good load—and to split a load which was only 200 pounds or so over the limit would not pay.

Next New Hampshire started a movement to see that trucks running into that State from Massachusetts are registered in New Hampshire, under the law requiring such vehicles to take out registration papers. They arrested a truck owned by a Somerville, Mass., man, stating that it had crossed the line a number of times and required a New Hampshire license. Massachusetts has not been so eagle-eyed in regard to New Hampshire trucks.

At the same time, Massachusetts sent out inspectors with a new device called a "Loadmeter" to pick up trucks on the Bay State roads for overloading. A number of drivers have been summoned into court for violating the Bay State overloading law.

The motor organizations of the three states are searching for the cause of this concerted action. President James J. Scully of the Motor Truck Club of Mass., called a meeting of his organization and outlined a plan for appointing a committee to see if some uniformity cannot be reached between the states, and also to consider whether there are any features back of the movement which require scrutiny.

### Bridgeport Buses Win Stay

BRIDGEPORT, CONN., Aug. 3.—By a Federal injunction issued by Judge Edwin S. Thomas of the United States District Court, officials of the State of Connecticut who had set midnight to-night as the zero hour for the enforcement of the new Connecticut jitney law, are restrained from making their contemplated moves for wholesale arrests and jitneys will continue to operate in the State until Aug. 16 at least, when the officials will have a chance to be heard on the order.

The temporary injunction was granted upon applications of Attorneys R. E.

Woodruff and Arthur Klein, of New Haven, who called upon Judge Thomas at his home in Norwalk Saturday afternoon. The petitioners in a bill of equity filed claimed that the new State law was in contravention of the constitution of the United States in that its provisions, if carried out, would be in the nature of property confiscation and an infringement upon the property rights of American citizens without due process of law.

### Transport Truck Prices Cut

MT. PLEASANT, MICH., Aug. 3.—Price reductions ranging from 11 to 25 per cent on three of the four models comprising its line are announced by the Transport Truck Co. The 1-ton model is reduced from \$1,850 to \$1,395. The 1½-ton from \$2,250 to \$1,995. The 3½-ton from \$4,195 to \$3,885. The price of \$2,785 on the 2½-ton model remains unchanged.

### Cyclone Announces Price Cut

GREENVILLE, S. C., Aug. 3.—The Cyclone Starter and Truck Co. announces a price cut of \$115 for its Model A cyclone truck. The old price of the truck was \$2,800, the new price is \$2,685. This price includes steel cab top with curtains, windshield, hubodometer, bumper, pneumatic tires, spare rim and starting and lighting system.

### Severe Rules for Bus Lines

DECATUR, ILL., Aug. 9.—Motor buses here must be operated by incorporated companies, must obtain a certificate of convenience and necessity from the state commerce commission, must carry indemnity insurance to compensate passengers in case of accident, and also must stop at railroad crossings. This developed when complaint was filed by the street railway company and the Wabash steam road, both of which objected to the operation of the motor vehicles.

### New Head of California Roads

SACRAMENTO, CAL., Aug. 10.—A. B. Fletcher, State highway engineer, will be appointed director of the new state department of public works. This is one of the seven new departments which took over the work of 71 agencies of the state government, under the reorganization plan recently put into effect. Mr. Fletcher's department will have complete charge of all highways in the state, their construction, upkeep and repair. Wilbur F. McClure, at present State engineer, will be associated with Fletcher, as chief of the division of engineering.

### Bus Line Increases Capital

ROCKFORD, ILL., Aug. 5.—The T. J. Fay Motor Bus Co. of this city has certified to the secretary of state of an increase in the capital stock from \$25,000 to \$150,000. The extension of motor truck and bus lines to Chicago and other long distance points forced the acquirement of many additional machines with the consequent expansion of the stock to cover. The company has been enjoying exceptional prosperity.

## Anti-Truck Campaign by Trolley Lines

### Nationwide Flood of Propaganda to Discourage Use of Trucks and Buses

NEW YORK, Aug. 9.—A nation-wide propaganda campaign in opposition to the widespread use of motor trucks is being conducted by the American Electric Railway Association.

The chief argument advanced against trucks is that they wear out the highways and do not pay a fair proportion of taxes. The campaign is being conducted by a committee of 100, representing traction companies in all parts of the country. This committee, acting through local electric railway companies, supplies the newspapers with editorials and other material which purports to show why the trolley companies are not being treated fairly because they are compelled to pay taxes and the motor bus freight and passenger car companies have no obligations of this character beyond their license fee.

### Complaints Against Bus Lines

BLOOMINGTON, ILL., Aug. 9.—Claiming that an injunction procured by the Chicago and Joliet traction line to prevent the operation of the motor bus line now operating between Lemont, Summit and Argo in northern Illinois, is not binding, the promoters of the latter have continued the machines and propose to do so. The Illinois Commerce Commission heard the arguments of the traction line asking that a certificate of convenience and necessity be withheld but failed to announce a decision. As a result, the buses have continued to operate and will do so until a decision is filed. A similar injunction was procured and a similar protest made before the utilities board in the case of the Des Plaines Valley bus line, which is also said to be injuring the electric line because of competition. The Chicago, Ottawa and Peoria electric line also complains about the competition of a bus line which operates between Starved Rock and Peru.

### Want Buses in Indianapolis

INDIANAPOLIS, Aug. 5.—With the local street railways company threatening to stop traffic in the streets where jitney bus competition has cut into its receipts, many more or less prominent citizens are advising that the trolley lines be done away with and bus lines similar to those in Chicago, London, and other cities, be substituted.

### Pierce-Arrow Reduces Prices

BUFFALO, Aug. 9.—The Pierce-Arrow Motor Car Co. has made sharp reductions in prices of its trucks. The 2-ton model has been reduced from \$3,750 to \$3,200; the 3½-ton from \$4,950 to \$4,350 and the 5-ton from \$5,700 to \$4,850.



## Indiana State Laws Called Unfair

### Truck Owner Refuses to Pay Fee and Files Appeal for Protection from Police

INDIANAPOLIS, IND., Aug. 6.—William F. Frye, owner of an Indianapolis transfer business has attacked the constitutionality and legality of the Indiana motor vehicle registration laws and asked for an injunction to prevent the enforcement of the amended acts, which sought to define motor vehicles, classify them, define chauffeurs and provide for licensing thereof. His request has been filed in the superior court.

Frye alleges that the amended statutes are discriminatory, faulty, because the title of the acts is said not to embrace the subject of licensing for revenue but for registration only for identification and police protection purposes; and take property without due recourse.

Frye asks that the officials be enjoined from collecting fees and taxes for registration of his vehicles because the police are said to have declared their intention of making a wholesale campaign on motor vehicles, owners of which have failed to comply with the provisions of the registration laws. It is alleged that the amended acts of 1921 are contrary to the fourteenth amendment of the Indiana constitution, in that the acts provide for taking property without due process of law. The motor vehicle registration section is said to discriminate between owners and users of motor vehicles and to provide an unjust and illegal scale of fees to be paid, without prescribing means by which horsepower of the motor vehicles shall be gauged.

A registration fee of \$5, Frye alleged, has been tendered to the secretary of state, but the latter refused to accept that amount. Frye states that he was arrested on eighteen charges on May 12, 1921, for refusing to pay the alleged excessive registration fee of \$75.

Judge Hall granted a temporary restraining order to prevent Indianapolis police and the sheriff and constables of Marion county and seven adjoining counties from arresting Mr. Frye for violation of the vehicle laws.

### Trucks Lower Price of Coal

BIRMINGHAM, ALA., Aug. 9.—That motor trucks may reduce the price of coal to consumers living in cities near coal mines is being practically demonstrated by the Phoenix Coal Co. and the Louis Pizitz Dry Goods Co. The owners of the two businesses are co-operating to give to the people of Birmingham coal at a reasonable price, at the same time breaking the coal buyer's strike, making money for the coal company and putting several hundred idle coal miners to work again.

Since July 11, the two companies have been delivering coal for prices ranging from \$4.25 to \$5.25 per ton, against retail prices of \$6 to \$10 now prevailing in

Birmingham. Orders for 2700 tons have already been placed and others are coming in all the time.

With every order, a brief description of the delivery facilities about the house is required from the purchaser and the size of the truck sent with the coal is adjudged accordingly. For small orders, such as are placed by individuals for home consumption, the 3-ton truck is most practical, according to Phoenix Coal Co. officials.

### Buses Replace Trolley Lines

DES MOINES, IOWA, Aug. 3.—A complete system of bus transportation will begin functioning on every street car line in Des Moines at midnight to-night, when street railway service will be suspended.

The suspension is the culmination of a controversy of several years, street car company officers declaring the present situation is the direct result of the inability of the company to operate under a 5-cent franchise without bus competition and under an 8-cent fare with unrestricted bus competition.

### Acetylene Lamps Legal in Mass.

BOSTON, Aug. 5.—After several conferences in which all sides of the question were threshed out, Motor Vehicle Registrar Frank A. Goodwin has finally approved acetylene gas headlights for the use of such trucks, cars and motor cycles as use them at present. While his order states that acetylene burners are "temporarily approved until a study of acetylene headlights now being made is completed, etc.," the approval is practically permanent.

### Donations Instead of Fares

ALLENTOWN, PA., Aug. 4.—Before chief examiner Phillips of the Public Service Commission, there was a hearing in the case of the Lehigh Valley Transit Co. against Eugene Komaromky, Alex Nemeth, and Leopold Sanzza here to-day. The company alleges the men, without a certificate from the commission, are competing with the trolley cars by running buses to Northampton Heights. The buses are popular and, it was alleged, the defendants do not collect any fares, but have boxes into which passengers drop donations.

## Wisconsin Classifies Truck Highways

### Allows 12 Tons Overall Weight on Class A Highways and 7 Tons on Class B

MILWAUKEE, WIS., Aug. 7.—The provision for classifying highways according to the load permitted on truck and trailer is one of the most important changes in the state law of Wisconsin. It was enacted at the biennial session of the legislature just ended, at the request of the State Highway Commission.

The provision reads, in part, as follows:

"Commencing January first, 1922, the highways of Wisconsin, maintained by the state or its counties, insofar as the limitation upon the use of motor vehicles, trailers, or semi-trailers, upon said highways is concerned, are divided into the following classes:

"(a) Class A highways shall include those highways upon which may be used any motor vehicle, trailer or semi-trailer weighing, with its load, not to exceed twelve (12) tons.

"(b) Class B highways shall include those highways upon which may be used any motor vehicle, trailer, or semi-trailer weighing, with its load, not to exceed seven (7) tons.

"The class into which any section of highway shall fall shall be determined by the State Highway Commission, if said section forms a portion of the maintained state trunk highway system; by the county state road and bridge committee, if said section is a highway, not a state trunk highway, maintained by a county."

As soon as the classifications are made, the state will issue a map for the guidance of owners and drivers of vehicles. Police officers are authorized to command drivers to take their vehicles to the nearest public scale in case of doubt as to the weight of the load. The law also requires:

"On and after January first, 1922, no motor truck, motor delivery wagon, passenger automobile bus, or trailer or semi-trailer hauled by or used in connection therewith, shall be operated by any person upon any highway of Wisconsin, unless the said motor vehicle, etc., shall have attached to or lettered upon each side thereof, sign giving its weight without load, the actual advertised load carrying capacity of such vehicle and the total weight of the vehicle and load, the last named being the total of the two above weights. Said weights are to be given in short tons and nearest quarter-fractions thereof.

### New 10-Ton Gasoline Rail Car

STOCKTON, CAL., Aug. 11.—The California Car Co., a new company, will have its factory completed by October first and in operation shortly thereafter. The company holds patents on and will build a 10-ton gasoline rail car to cost about \$12,000.

## Coming Events

1921

September, 1921—Sacramento, Cal. Seventh annual truck show during State Fair, State Agricultural Society, Sacramento.  
Sept. 5-10, Indianapolis. Motor Vehicle Show, Indiana Fair Grounds.  
Sept. 9-17, Ottawa, Ont., Motor Truck Show, Howick Hall.  
Sept. 28-30, New York City, Electrical Show, 71st Regiment Armory.  
Sept. 2 weeks, Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.  
October 12-14—Chicago, Annual Convention of the National Implement and Vehicle Assn. H. J. Samiet, Sec'y., 72 West Adams St.  
Oct. 24-29, Oakland, Cal., Annual Convention International Traffic Officers' Assn., Municipal Auditorium.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. O. Building  
239 West 39th Street, New York

## CONTENTS

Vol. XXV, No. 3

September 1, 1921

### LEADING ARTICLES

Get Ready for Winter—Now! .....	8
When the Tires Sweat Dollars .....	10

### MISCELLANEOUS ARTICLES

Consideration Pays! .....	13
Idle Time Reduced with Special Body .....	14
Smoothing the Truck Path .....	15
Do You See the Difference? .....	19
What Does Your Truck Cost? .....	20

### DEPARTMENTS

Correct Wrench Equipment Speeds Up Repairs....	16
Simplex Bodies Standardized .....	18
The Better Way .....	22
Buyer's Department:	
Larrabee 1-Tonner Built for Speed .....	26
Automatic Electric for Small Merchant .....	26
Buffalo 2½-Tonner Has 10-Speeds Forward ..	27
Truck Accessories .....	28
Shop Equipment for Fleet Owners .....	30
Motor Truck Electric System Wiring Diagrams ..	32
The Fleet Owners' Forum .....	33
Editorial: When They Wear Thin .....	36

### NEWS

New Freight System Out of Pittsburgh .....	37
Trolley Company to Operate Buses .....	37
Maximum Capacity of 5 Tons in Texas.....	38
Indiana Truck Owners to Organize .....	38

Index to Advertisers.....84-85

## The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT

David Becroft, Directing Editor

Sinclair Gluck, Managing Editor

F. Eugene Spooner, Technical Editor

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under act of Congress, March 3, 1879

### BRANCH OFFICES

Chicago, Mailers Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536 540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account .....	
of Zone Postage Law .....	.50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

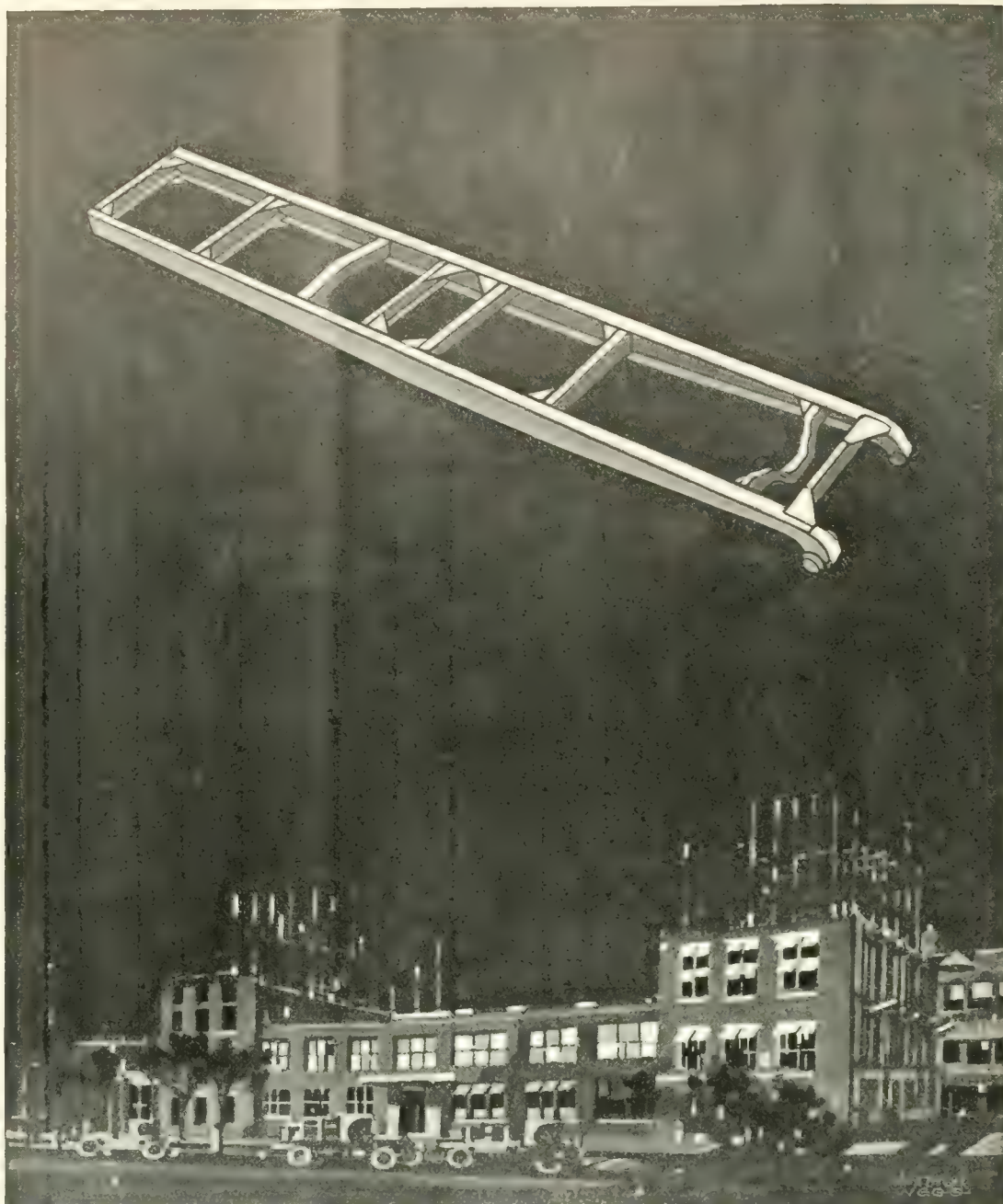
### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



There is no  
Substitute -  
FOR  
Wyman-  
Gordon  
Quality

WYMAN · GORDON  
*The CRANKSHAFT MAKERS*  
WORCESTER, MASS. CHICAGO, ILL. CLEVELAND, OHIO



## PARISH & BINGHAM PRESSED STEEL FRAMES

The Preeminent quality of P & B Frames has been recognized by the better class truck and car manufacturers for over 17 years.

The lighter P & B Pressed metal parts (axle housings, step hangers, brake drums, running boards, etc.) enjoy an equal measure of popularity in the automotive industry.

*Frame Makers for Cars of Quality Since 1904*

**Parish & Bingham Corporation**  
Cleveland, Ohio, U. S. A.





# *The* **COMMERCIAL VEHICLE**

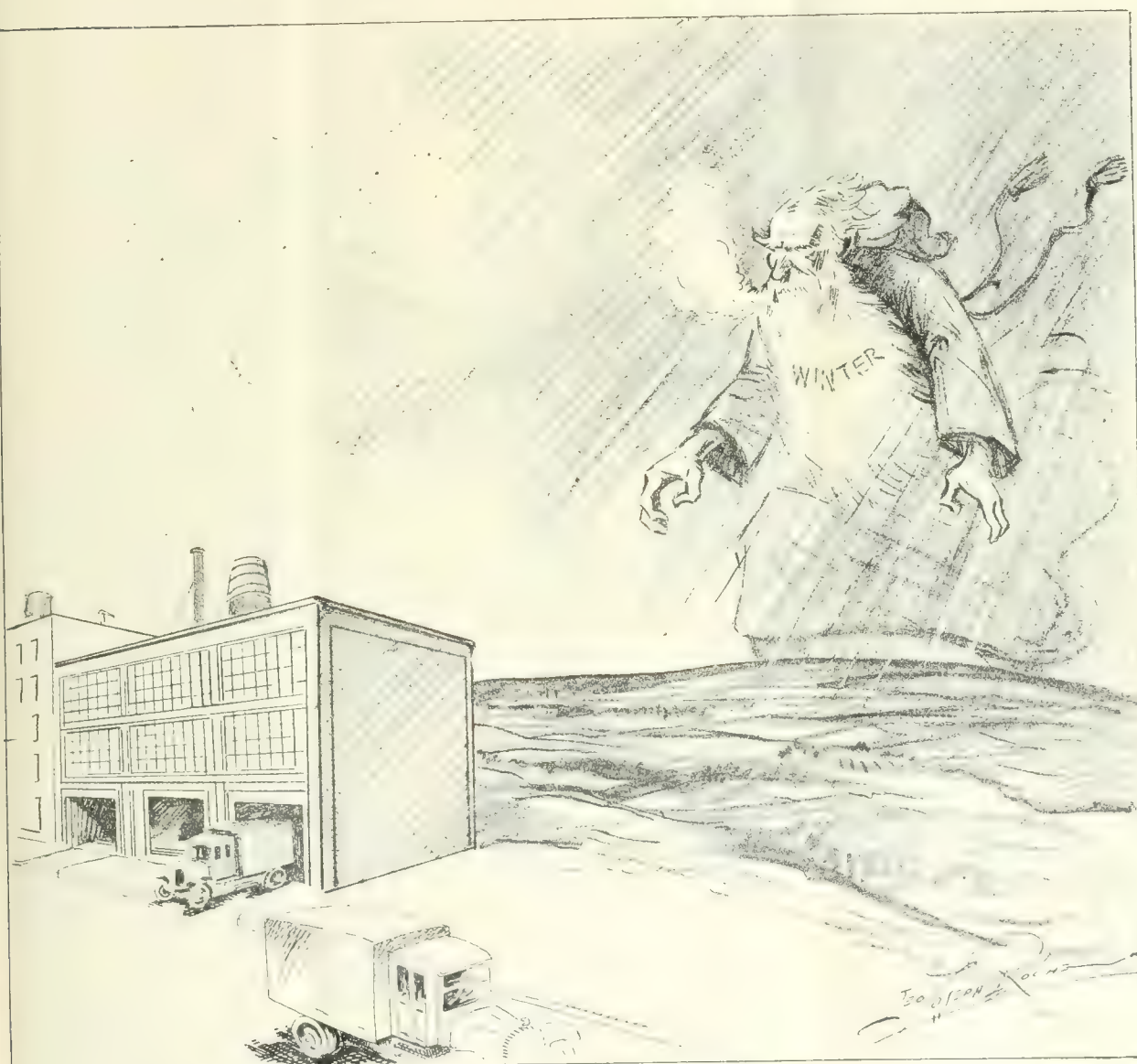
*Read by Fleet Owners*

Vol. XXV

Sept. 1, 1921

No. 3

**Are You Ready for Him?**



***Have You Made the Preparations  
Described in the Next Two Pages?***

# Get Ready for Winter—Now

*Don't Wait Till Too Late! See That You Are Prepared in All the Ways Mentioned Here*

**N**OW is the time to think about the winter!

There are many features of operating trucks in winter which do not apply in summer or in warmer weather. Attention to these details will not only save money in repairs, but is necessary in many cases to allow the trucks to operate at all.

However, if we wait until the cold weather is upon us and the snow is on the ground, it may be too late. Therefore, begin now to get ready, so that everything needed will be at hand when the need for it arrives.

## Radiators and Protectors

The foremost danger to motor trucks from cold weather is the freezing of the radiator and cylinder water jackets. If the water in the radiator is allowed to freeze, either at night or while standing somewhere out on the run, endless damage may result. In the first place, the radiator may be damaged beyond repair, and in the second place, if it is possible to start the engine, the failure of the cooling system may result in shearing the pin on the pump. The pistons, the cylinders, etc., are also liable to damage.

There are two protections against freezing the water in the radiator. The first is to keep the radiators filled with an anti-freezing solution which will prevent freezing under any but the most rigid of winter conditions. In the latter case, the first method may be supplemented by the second, which is to empty the radiators at night.

For temperatures above 5 degrees below zero, a prominent truck manufacturer recommends the following anti-freezing solution:

Wood alcohol .....	15 per cent
Glycerine .....	15 per cent
Water .....	70 per cent

For temperatures not lower than 15 degrees below zero, the following solution is recommended:

Wood alcohol .....	17 per cent
Glycerine .....	17 per cent
Water .....	66 per cent

Glycerine is the most expensive of the ingredients of the two solutions mentioned above. But it will not evaporate,

so that it need not be replaced from time to time, as is necessary with the alcohol, which evaporates at low temperatures.

Neither of the above solutions is injurious, but the ingredients of any other anti-freezing solution should be the first consideration before it is put into the truck cooling system.

## Hints on Preparedness

These two pages contain a number of hints on getting ready for the cold weather that is coming.

THE COMMERCIAL VEHICLE will publish further articles on this subject from time to time. But a perusal of stories already published will add to the sum total of your knowledge of this subject. The articles in back issues of THE COMMERCIAL VEHICLE are:

Cold weather hints on Mack trucks—Oct. 1, 1919.  
Cold weather hints on Packard trucks—Oct. 15, 1919.  
Cold weather hints on Kelly-Springfield trucks—Nov. 1, 1919.  
Cold weather hints on Garford trucks—Nov. 15, 1919.  
Cold weather hints on Autocar trucks—Dec. 1, 1919.  
Cleanliness in winter. An editorial—Dec. 15, 1919.  
Articles on fighting snow in each issue from Sept. 1, 1920, to March 1, 1921, except Jan. 1, 1921.  
Article on sandbox to prevent skidding—Sept. 15, 1920.  
Using kerosene in radiator is harmful—Forum—Oct. 15, 1920.  
Tests for lubricating oil Forum—Oct. 15, 1920.

All, or nearly all, of these articles should be of interest to you at this time.

## Look Them Over!

For temperatures lower than 15 degrees below zero and for all temperatures below freezing when no anti-freezing solution is used, the following precau-

tions should be taken. The trucks should be stored at night in a garage which is kept above the freezing point.

If this is not possible, the radiators should always be emptied at night and particular care should be taken to see that nothing clogs the pet cocks and prevents some of the water from running out.

Finally, the radiators should be supplied with protectors, so that the engine can be kept at a temperature similar to that of summer conditions and to prevent the water in the radiator from freezing, if the truck is obliged to stand while out on the run.

Whatever plan is followed, see that your anti-freezing solution is on hand before the cold weather arrives or that you have an adequate supply of radiator and hood protectors, and that these are in proper repair, or both.

## What Oil Should Be Used?

Then there is the question of lubrication. Every truck master knows that in hot weather the viscosity of lubricating oil is decreased. Therefore, a lighter oil should be used in winter than in summer, to obtain the grade best suited to the engine when running in cold weather. Be sure that you know what grade of oil to use. If you do not know, get the manufacturer's instruction book, or get in touch with the manufacturer, and find out. And when you have found out, be sure that you have the lighter oil on hand in readiness for the cold weather.

It is more difficult to vaporize the fuel in winter than in summer. For this reason a certain amount of unvaporized gasoline may leak down past the pistons when the engine is first started. Therefore, the oil should be watched and changed more frequently in winter than in summer to maintain its lubricating qualities.

## General Mechanical Hints

The winter is by far the hardest time of the year for trucks, just as it is for horses. Therefore, the inspection and overhaul schedule of the trucks should be arranged so that all the trucks will be in as nearly as possible perfect mechanical condition before the cold weather comes.

This should be done now!

See that both sets of brakes operate properly and that they are equalized.



Nothing will make trucks skid quicker than unequalized brakes.

Examine the transmission and differential for lubrication. See that they are filled with a grease that will flow. Have all steering and front axle connections tight. Driving into snow piles and frozen mud with the front end in a loose condition is bound to mean trouble.

Thoroughly inspect, clean and adjust the ignition system. Starting a motor with present day fuel in cold weather is difficult enough without adding trouble in the ignition system.

Keep the spring leaves well lubricated. A dry spring is apt to crack in cold weather.

Go over the entire fuel system. Make sure that there is no water or sediment in the gasoline tank. Clean out all water and sediment from the carburetor by opening the pet cock and passing a wire up through it to start the flow. Inspect the cooling system carefully to be sure that there are no small leaks in it. This is always important, but is especially so if a non-freezing mixture is used.

### Comfort of the Drivers

The next thing to be considered is the comfort of the drivers. Experience has shown in innumerable cases that better, quicker and more efficient work is accomplished by the drivers if their comfort is considered and they are enabled to carry on their work under conditions involving the minimum of discomfort.

This has been shown even in summer work in the delivery of ice cream. For where the men have to dig the ice cream cans out of packing ice, they are always wet and uncomfortable, and their work is not so well done; while if a refrigerator body is used and the cans are packed in the body in a dry compartment, the work is done more promptly and the men are more contented, healthier and better disposed toward their work and the firm employing them.

If this is true of such comparatively slight discomforts as the above, it is doubly true of winter work.

Keeping the driver comfortable in his cab while driving, depends upon many things. In the first place, the cab should be entirely enclosed. It should be fitted with weather proof doors, weather proof windows and storm curtains, so that it is as free from cold blasts and even small drafts, when entirely closed in, as any well made house. But to insure this comfort, especially in northern localities, you should see that the cabs are inspected *now*, that any necessary repairs to doors or windows are made *now*, and that there is an adequate supply of storm curtains on hand *now*, against the time when they will be needed.

If you are going to use truck cab heaters this winter, look them over now; be sure that you have an adequate supply of them and be sure that they are in good condition ready to attach, and that they can be readily located when needed.

Lastly, if you make a practice of supplying the drivers with heavier uniforms and with gloves in winter, be sure that you have an adequate supply of these on hand, that they will fit the

drivers and that they are in good repair, so that neither the comfort of the men nor their personal appearance will suffer when the time comes to use these winter garments.

### Garage Conditions

There is also the question of the garage in winter time. Whether an anti-freezing solution is used in the radiators or not, it will be far better for the trucks if the garage is adequately heated. If repairs of any magnitude are attempted at the garage, involving the continual presence of a mechanic, garage heating is absolutely essential, because no mechanic can do his best work or even good work when his hands are so cold that he cannot hold his tools.

Under these conditions, the garage should be maintained at a temperature well over 55 degrees Fahr.

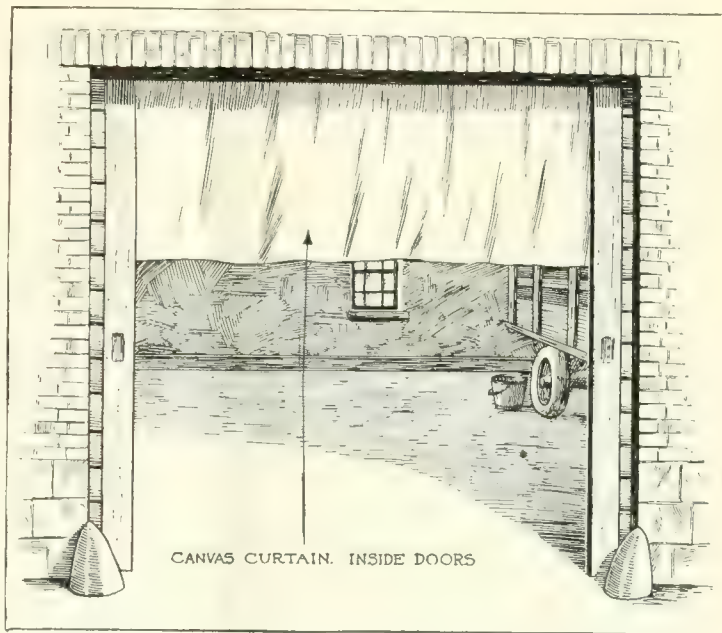
Therefore before the winter is upon you, make sure that the heating plant is in first class condition, that there is an adequate supply of coal on hand and that the pipes which circle the garage are well protected against freezing where they are exposed to outdoor cold, or even indoors during a particularly cold spell, when the fires are allowed to die down at night.

It may also be worth while, if the garage is a large one, to partition off the section devoted to repairs with a partition running all the way to the ceiling and keep that room at a higher temperature than the rest of the garage. A temperature of 50 degrees or so is ample to keep the trucks in excellent condition, but it is hardly sufficient to secure comfort to men who are doing work which involves comparatively little heavy labor, and in that sense is almost sedentary.

If the garage is not maintained at a high temperature, and if the place where the mechanics work is not shut off from the rest and maintained at a higher temperature, you should be sure that there is an adequate supply of wooden platforms in front of the work benches and the floor tools, so that mechanics are not obliged to work with their feet on the cement floor. This is always a hardship and means a great deal of discomfort, especially in very cold or very damp weather.

Finally, some means should be taken to prevent the warm air from escaping too rapidly when the big doors are opened to permit the trucks to pass in and out.

The men should be instructed to close the doors as soon as possible after the trucks have passed in or out. Moreover, it is easy to construct some sort of a curtain at the top of the doorway, which will prevent the warmer air at the top of the garage from passing out at the top of the doorway when the doors are opened, but which will not interfere with the passage of the trucks.



*This curtain, designed to keep the warm air in the garage during cold weather, should be hung high enough to give the trucks head room. If it is not hung too low, the truck bodies will brush it aside without injury to either the trucks or the curtain*

Such a curtain is shown in the accompanying illustration. If such a device is used, be sure that it is on hand, in good repair and ready to be placed in position when needed. Do this *now*. It will save trouble later.

### Hints for the Drivers

Finally, there are a number of hints which you can give the drivers on the care of their vehicles during the cold weather, which may prevent a great many tie-ups and much loss of time, and may serve to keep the vehicles in better condition and save a lot of expense.

Here are some of these hints. It may be as well to get these and others into shape to hand to the drivers when the cold weather does come. But if this is done, do it now and be prepared.

If the gasoline supply is cut off, due to water frozen in the settling chamber or carburetor chamber, thaw out by wrapping a rag soaked in hot water around the frozen part.

If the truck is frozen to the ground, do not attempt to move it with the engine, as serious breakage may result. Do not attempt to pry it loose either. Thaw out the ice or frozen mud by pouring hot water around the lower section of the tire, where it is frozen down.



# When the Tires Sweat Dollars!

*This Article Tells of Inefficient Methods of Driving and Maintenance Which Waste More Money on Tires Than Can Ever Be Saved on Fuel. Show It to Your Drivers*

By A. F. MASURY\*

**T**HE progressive and experienced garage superintendent is always looking for new ways to cut costs. If he is on the job, he is also looking for improvements in old cost-reducing methods.

One of the most frequent causes of excessive costs is wear on the tires. Therefore, this question of tire costs offers a fertile field for cost reduction. Misuse of tires, either in actual running or in the repair department, may cause a very heavy addition to the cost of the truck. Moreover, there are many ways in which tires can be and are misused, from the standpoint of the highest efficiency and economy.

In this article an expert in the automotive field gave his views on efficient methods in tire cost reduction. Read it carefully and see that your drivers and mechanics read it and digest it. Such a course may save you thousands of dollars in tire charges, both for new tires and for repairs.

To many, economizing in the operation of motor trucks means saving gasoline. But saving of tire cost is equally important.

On heavy trucks, tire cost and fuel

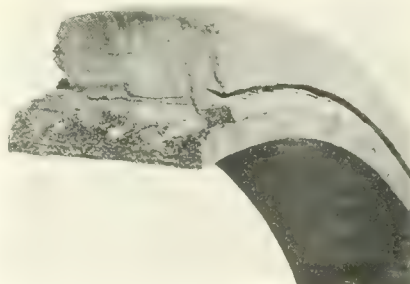
cost are about equal. On lighter vehicles, tire cost is slightly less than fuel cost. Why, then, should we hear so much about means of saving gasoline and so little about economizing on tires?

While the two items of cost are normally of about equal magnitude, abuse of tires can raise their cost out of all proportion to their normal cost and far beyond the utmost extravagance in fuel.

## Not Easily Detected

It is a fortunate circumstance that gasoline waste inevitably limits the ability of a truck to perform and that unless the carburetor adjustment is set for reasonable economy, the truck will hardly operate at all. Consequently it cannot consume an excessive amount of gasoline.

Tire abuse, on the contrary and most



*Crack and separation on this tire are due to repeated overloading*

unfortunately, limits the performance of the vehicle but little. Therefore, it is not so easily detected.

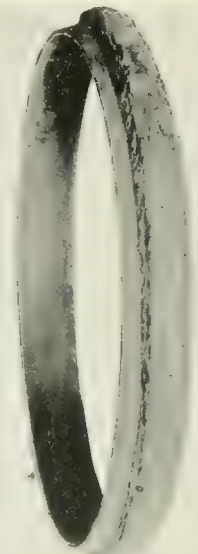
In addition, tire abuse gives rise to increased chassis maintenance cost and even increased fuel cost. It is not uncommon to encounter a truck whose owner is extremely particular about the carburetor adjustment, who employs the latest air-warning devices and insists that the engine be shut off at each stop.

But the tires on the same truck will be cut and slivered, the wheels will be out of line and the truck will be running in the car tracks.

A truck will actually consume less gasoline without a governor than with one, but removal of the governor and consequent overspeeding imposes a heavy toll on tires.

Commonest among tire abuses are:

\*Chief Engineer, International Motor Company, New York City.



*This wreck of a tire has been driven in car tracks and is an advertisement of incompetent driving and needless waste*

Overloading, overspeeding, running in car tracks, neglecting cuts and tears, spinning, skidding and sliding the wheels, and wheel misalignment.

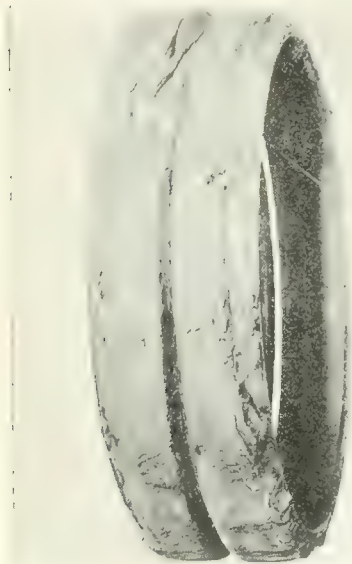
## Some of the Abuses

Overloading stresses the tires beyond their elastic limit, utterly destroying the life of the rubber and the durability and cushioning ability of the tires.

Overspeeding, even with a light load, has the same effect, since the increased speed causes the impact of the tire on road bumps to be magnified. Running over a bump at twice normal speed pounds the tire eight times as hard and consequently may overload it 400 per cent at one spot.

Running in car tracks simply cuts the tires by centering the pressure at one point instead of evenly over the tread. The edges of the rails, particularly of the guard flanges of street car tracks, become sharpened by the friction of the car wheels and running tires over them is much like running them over the edges of steel knives.

When solid tires are cut or torn by glass or sharp stones, the rubber slivers, much as the cuticle of the finger on a hangnail! If this annoying condition



*Neglected hangnails and cuts have brought this tire to an untimely end*



is allowed to go on without attention, the hangnail will split further until it becomes decidedly painful and results in an enduring disfigurement of the finger. If it is promptly cut, close to the flesh, it will soon heal and disappear.

Similarly, slivers on solid tires should be promptly cut off entirely, as soon as they appear. Care should be observed that a clean notch is made just below the end of the tear. If the sliver is left on, it will contribute nothing to the strength of the tire, but will continue to flap and the tear will extend until half the tread width is torn loose.

**Spinning and Sliding**

Spinning and sliding the tires in starting and stopping and skidding while rounding curves also have a serious destructive effect. When losing traction, many drivers will speed up their engines under the erroneous impression that this will increase traction. It actually does the exact reverse. The slower a wheel turns the better traction it has. Furthermore, the more gently it is started turning, the less liable it is to slip. When a wheel begins to lose traction, the driver should throttle down his engine, retarding his spark and being ready to release his clutch to prevent stalling. He should always let his clutch in gently. Low gears should be used, as this will permit the wheels to be turned very slowly without so much danger of stalling the engine.

In applying the brakes, the wheels should not be made to slide. Not only does sliding the wheels injure the tires, but it reduces the braking effect. The quickest stop is made when the wheels are just turning and the abrasion on the tires is least.

Skidding while rounding curves is unnecessary. It is dangerous. It is due to turning at excessive speed. And in many cities it is illegal. Moreover, it is very destructive to the tires.

**All Abuses Are Harmful**

All these abuses do untold harm to the tires. A tire is made to roll over the ground, not to slide. Sliding the wheels of railroad cars causes flat wheels. If sliding a hardened steel tire over a smooth steel rail for a few seconds can so abrade the wheel that its pounding will crack 150 lb. rails, imagine the damage to a rubber tire in skidding or sliding over a road of stone or concrete!

Besides these more obvious causes of excessive tire wear, there is an insidious cause which is too apt to be overlooked. This is faulty alignment. The tire rolls smoothly and with the minimum of wear when the wheels are properly aligned. But if the wheels are out of alignment the tires have a combination of rolling and sliding movement over the road which causes rapid wear and consumes power.

**Cause of Wheel Wobbling**

There are two forms of faulty alignment, namely, that in which the wheel itself is out of true, so that it wobbles, and that in which the wheel spindle is at an improper angle, so that the wheel is constrained to a position excessively

out of parallel with the direction of vehicle motion.

Wheel wobbling is caused by strains and warping of the wood. Some of the strains which get wheels out of true can be avoided. When a truck is driven diagonally into the curb when a corner is rounded too sharply, or, when a boulder is struck a glancing blow, the severe lateral strain at one point of the circumference of the wheel is apt to warp it.

Sometimes carelessness in applying or removing pressed-on tires warps the wheel; and in some cases a careless operator will press the tire on crooked, so that the effect on the tire is the same as a warped wheel. The remedy is to have the tire pressed off and the wheel trued by a wheelwright.

Misalignment of the wheel spindles is due to excessive shocks, such as running into curbs, overspeeding on rough

stretched across the corresponding points on the opposite wheel. Care should be taken to have the tape level and stretched tight. The bottom points of the felloes are then checked and then the rear points. All three of these measurements should be the same.

The most common misalignment of the rear wheels is what is called a spraddle. This means that the bottoms of the wheels are further apart than the tops. If this condition is found, the wheel bearings should be inspected for looseness first. If these are properly adjusted, then the axle should be straightened.

**Front Wheel Alignment**

Front wheels should not be parallel. For greater strength and easier steering they are cambered. This means that the wheels are further apart at their tops than at their bottoms. To correct the



*The double tire was ruined by turning corners at high speeds and consequent skidding, which ripped the rubber away. The other tire has been practically destroyed before its time by repeated spinning of the wheels and also by allowing the wheels to get out of alignment*

roads, and so on, which bend the axles or the steering arms of the front steering knuckles.

The destructive effect of a slight misalignment can readily be appreciated when one realizes that if a wheel is only out of line one degree horizontally, it must slip 92½ feet sideways in a mile of travel. The destructive effect upon the tire is the same as though the truck were pulled sideways that distance by a winch. And one degree is only equal to about 9/32 of an inch on the periphery of the tire.

**Getting Proper Alignment**

Alignment of the wheels can only be made true by accurately checking the distance between the wheel felloes. There are several good ways of doing this and a number that are not so good.

Most motor trucks have their rear wheels dead parallel. To check their alignment, the simplest method requires two men and a tape. The end of the tape is held against the front side of the inside face on one rear wheel and the tape

resulting tendency for them to roll incorrectly, they are correspondingly gathered at the front. This means that their fronts are drawn in or toed-in, usually about ¾ in. Measuring as before, correctly aligned wheels will have their bottoms and their fronts about the same distance apart. The bottoms may be ¼ in. closer together than the fronts, but should not be further apart than the fronts.

If these measures are incorrect, the toe-in at the front may be adjusted by means of the tie-rod, which is threaded for adjustment. Before adjusting the tie-rod, however, it is as well to make certain that the steering arms have not been bent. This may be determined by measuring the distance from the ball or pin, as the case may be, to the wheel felloes. The two arms should be the same distance from their respective wheels. If they are unequal, the one that is bent should be straightened until it is the same distance from the wheel felloe as its mate. The final adjustment should then be made on the tie-rod.



The above checks apply only to the alignment of the wheels with each other. Another important check must be made on the alignment of the axles with the frame.

Naturally the axles should be perpendicular to the chassis center-line. This can best be checked by selecting a fixed point at the center of the frame, such as the front universal, and checking the measurement from it to the nearest unobstructed point on each rear wheel. The two distances should be equal.

If these distances are unequal, be sure that the truck is on level ground and that the two rear springs are deflected equally. This may be checked by measuring the distance from the bottom of each frame side-rail to the axle. If these are unequal, a jack may be used to raise the low side of the axle to the same height as the other side.

The measurement to the universal can then be repeated. If it is still found to be unequal, the cause will be found either in unequal radius rod adjustment or, if no radius rods are fitted, in loose axle spring clips, which have permitted the



*A very few hundred miles of over-speeding have disintegrated and destroyed this tire*

springs to shift.

At the front a similar check may be made from some central point on the crankcase to opposite points on the wheels.

Too many motor truck superintendents neglect to have the wheel alignments checked until the occurrence of an accident or a defect that necessitates a serious repair.

But misalignment is apt to result from minor causes in daily service. Therefore, unless these alignments are frequently checked misalignment may go unnoticed, bringing about excessive tire destruction without readily apparent cause.

The up-to-date garage superintendent, who has the interests of the firm at heart and wishes to cut costs wherever he can, will do well not only to consider the above facts in detail, but to institute a regular system of inspection for misalignment and a regular course of instructive talks to the drivers on the question of excessive tire wear through careless starting, stopping, turning and driving.

### *Fooling With the Carburetor, I. Steeronly Learns, is an Expensive Proposition*



## Stopping the Leak

### *How Drivers Affect Costs*

The little illustrated story on the left is one of a series published by the Acme Motor Truck Co. in its house organ. The pictures are of a humorous nature, but all of them are true and they all deal with points which may well be borne constantly in mind by fleet owners.

The fact is that, in very many ways, your truck investment and the success of your truck investment is at the mercy of your drivers. And your drivers work under peculiar conditions which render adequate and constant supervision impossible.

Your trucks will last long or depreciate rapidly according to the way your drivers treat them. Your tires will do the same. Your gasoline bill will be reasonable or out of all reason, according to the way your drivers drive.

### Tell the Driver

Therefore, it is up to you to instruct the drivers at all times and in all ways as to what is expected of them as drivers.

The instance shown in this illustration is a case in point. This driver decides to regulate his carburetor himself instead of having it regulated at the repair station and high gasoline costs are the result.

But back of his arbitrary action—which is called to his attention as a mistake by another driver—is the fact that he has not been instructed on this point by his superintendent. That is where you come in—in this instance as in others.





Scene in the offices of the Marshall Field garage and service station, Chicago. Superintendent William Yeager, who is the central figure in the smooth running system, is on the right. His able assistant superintendent, T. Ben Johnson, is on the left

## Consideration Pays!

Low Turnover and High Efficiency Won  
Among These 600 Drivers and Mechanics

**L**IKE a well-oiled Corliss engine operates the garage and service station of Marshall Field & Co., Chicago. The present method of handling wholesale and retail deliveries represents the last word in system. It is the evolution of many years. Friction and errors have been reduced to the minimum. Efficiency and economy of operation are at the maximum.

Every man of the 600 engaged in the delivery department of the great establishment appears to be animated by an *esprit de corps* which is certain to produce wonderful results. There appears to be a loyalty and enthusiasm which is as rare as it is commendable and which has been repaid by the management in a constant effort to promote the welfare of the great body of employees.

They appear to have become wedded to the establishment, and long tenure of service is the rule and not the exception. Some of the drivers and attachés of the other sections of the delivery department have been on the payrolls for more than 40 years, commencing with the first horse delivery service and being retained when the change to motorized equipment was decided upon.

Supt. William Yeager and his assistant, T. Ben Johnson, who have supervision over the service station and

delivery department, endeavor to win the confidence of every man under them. Both of these men are in constant association with the drivers, as well as all other attachés. The employees are impressed with the idea that the welfare of one is the concern of all and that they are free to call at the office any time for a conference and heart-to-heart talk. The drivers and others are encouraged to narrate any trouble and advice is freely given.

New problems are constantly arising and must be solved. Monthly, and sometimes weekly, conferences are called. All of the drivers and, perhaps, the employees of other departments, are asked to meet with the superintendent and assistant, and there is an informal discussion of ways and means that is mutually helpful and leads to a better understanding.

Every employee is urged to make suggestions or advance ideas calculated to improve the department, increase its efficiency, decrease operating expenses, or otherwise promote economy. The supervisory officers give these suggestions careful study and, if believed to be wise, they are adopted.

Complaints filed against a driver or other attaché are carefully investigated. The man at fault is asked to appear in his own defense. If the complaint is found to be correct, the employee is given some well meant advice either by

Superintendent Yeager or his assistant and appealed to from the standpoint of the reputation of the firm, not to commit the offense again.

Great pains are taken to straighten out any employee who might be inclined to deviate from the high standard set by the firm. Many of the most valuable men on the payroll to-day would have gone to ruin, in all probability, but for the excellent advice given to them and the judicious means adopted to bring about a reform.

Great stress is laid by the firm upon the personal touch and association. It is desired to build up a brotherhood of faithful and loyal employees, all of whom are convinced that the men in authority are their well wishers and their friends.

While discipline is strict and the rules laid down are ironclad, yet none convey an injustice to the men affected. Every attaché of the firm is given a bonus at Christmas, rated in accordance with the length of service, while every employee of the plant who has been on the payroll more than 1 year is given a vacation of 2 weeks with full pay.

As a result of this policy of community interest, strikes are unknown in the Marshall Field establishment. When the great walkout of teamsters in 1919 paralyzed the delivery service of nearly every other institution in Chicago, the drivers of Marshall Field kept steadily at work. Efforts of labor leaders and professional agitators to lure the men from their work were fruitless. Threats and appeals were alike unavailing. It was a case of business as usual. The loyalty and faithfulness of the employees at that period, as well as in former years, demonstrated that the policy in vogue was not a mistake.



# Idle Time Reduced with Special Body

## Double Compartments and Easy Access to Ice Cream and Ice Help This Body Pay Dividends

THE RUSS BROS. ICE CREAM CO., Harrisburg, Pa., has designed and built a body which gives convenience in taking out ice cream and ice. Other advantages claimed for this construction include the small amount of ice necessary, convenient method of carrying ice cream bricks, and easy access to the compartments.

This body is divided into two compartments, as illustrated. The smaller forward compartment is for fresh ice, the larger rear compartment for ice cream. Underneath the body on the left hand side is a small refrigerator compartment for brick ice cream. The top space above these compartments is for empty cans, tubs, etc., in fact for anything which may be desirable to carry along. In this top space a salt bin is provided. The salt runs down through a 2½-in. pipe and is delivered into a tub or bucket on the curb side by means of the valve, which is shown in the illustration. The fresh ice chute, it will be noted, is also on the curb side and is amply large enough to allow shoveling into tubs or buckets. The drip from this forward compartment comes out through the chute and since there is no salt in it, it is not objectionable. The rear compartment, however, having salted ice in it, has a drain which is closed by a valve on the curb side. As a result, it may be drained at any curb sewer opening, thus avoiding salt stains on the pavement.

Large doors are provided at the rear so that the driver can walk into this compartment for the purpose of getting out either ice or cream.

The rear compartment is amply high enough for two layers of cans standing upright. When loading, the entire floor space is covered with cans setting upright. These are then covered with salted ice which also fills the space between the cans. A second layer of cans can then be set in and covered with salted



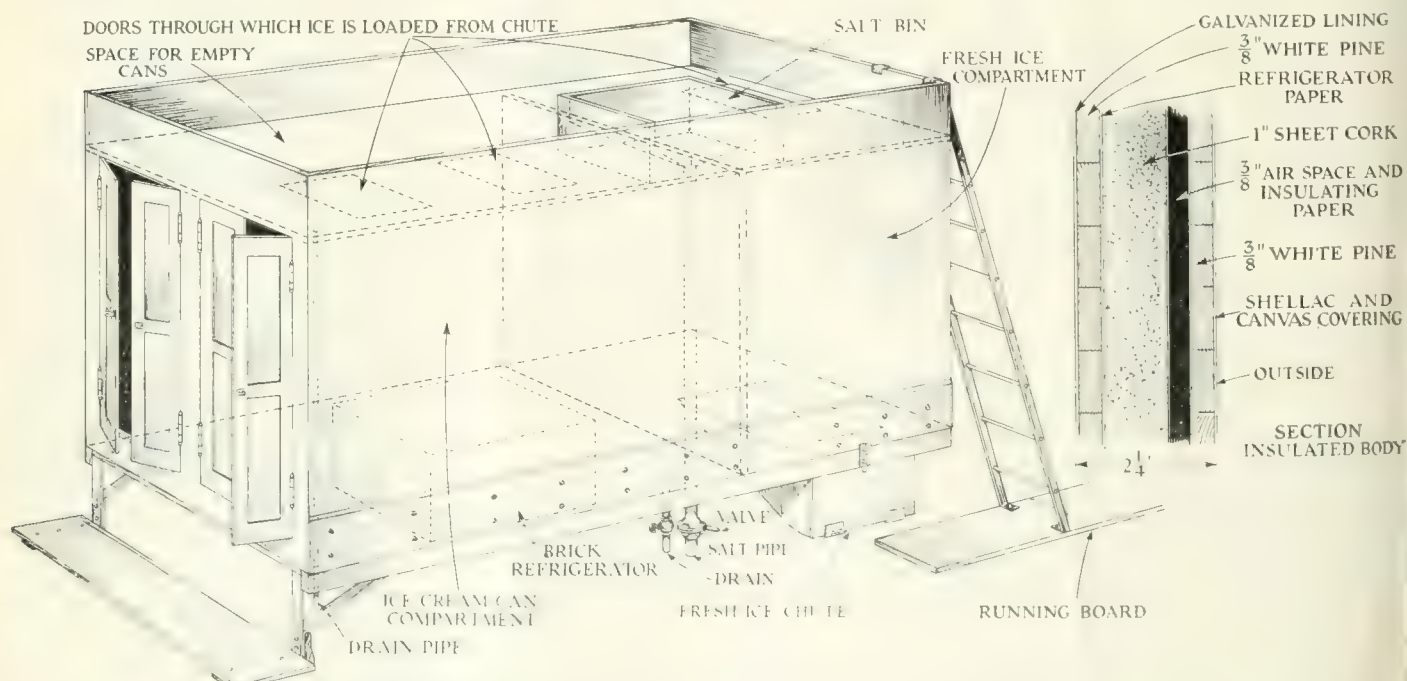
Side view of Russ Bros. ice cream truck with fresh ice chute near runningboard.

ice. The ice flows into the body from a chute through doors in the top. When ice cream is delivered the ice and salt covering the cream is used for packing. This ice is salted very lightly because very little is needed to keep the cream in this insulated body. Additional salt must be used in packing up.

The body is insulated as shown in the accompanying illustration. This insulation covers the bottom, sides, ends and top of the body. Heavy steel pans cover the bottom of both compartments and turn up on the sides about 8 in. These are watertight, especially in the rear compartment, to prevent drip of the salt water.

Drains are provided from the top space, one in each corner, so that in case of rain when the tank is in service it will get away. A convenient ladder is provided for climbing to the top of the body.

The brick refrigerator underneath the body on the left hand side is for the purpose of carrying bricks which are not iced. Coils are provided within this small refrigerator space. The brine from the rear compartment runs down through this smaller refrigerator piping, keeping the bricks within this space hard. The body has a capacity of about 400 gal.



Details of the Russ Bros. ice cream body design and construction of walls.





*Before and After. Two views of a factory driveway, showing the immense improvement effected by clearing away the rubbish and building a concrete driveway for the trucks. This alteration materially lessened the running time of the trucks*

## Smoothing the Truck Path

### Concrete Driveways Speed Up the Trucks

THE modern motor truck is built and equipped for at least moderate speed, for more rapid deliveries as well as greater carrying capacity are its great claim to supremacy over the horse.

Where trucks make deliveries and collections for factories, especially of freight, the roads between the factories and the freight stations are usually in pretty good condition nowadays.

But what about the roads and driveways in and about the factory ground itself?

Many trucks which operate on excellent roads for the majority of their runs, are forced to bump over and through all sorts of holes and ruts and refuse, when leaving or approaching the factory itself.

This is very bad economy for many reasons. In the first place, factory surroundings similar to the illustration shown at the top of this page, are a bad advertisement for the factory. Moreover, they will inevitably have a bad effect upon the minds of the employees, tending to make them careless and slovenly.

But such conditions are still worse when the trucks have to pull through them. Because they not only delay the vehicles each time they enter and leave, sending up the cost per mile, but they are also very hard on the tires, shortening their lives to an appreciable extent.

Try applying concrete to the factory driveways and see how it will decrease truck operation costs.



*View of an ideal approach to a factory. Here not only has a concrete driveway been built, but the entire approach is attractive to the eye*



*The same idea applied to the approach to a freight yard. Note that the street at the bottom is cobbled, but the freight yard approach is concrete, which makes it easier for the trucks to climb the slope*



# Correct Wrench Equipment Speeds Up Repairs

*Solid Wrenches, Speed Wrenches and Special L and T Wrenches Rapidly Replacing Adjustable Type for Rapid Work on Bolts, Nuts and Cap Screws.*

WHILE the adjustable wrench in its various forms is an indispensable tool around the shop for certain special operations, for speed work, its place is being taken by the solid end wrench, the socket wrench and the special L and T wrench. The bolts and nuts are not only moved faster but the actual handling of the wrench uses less time because the solid wrench is exactly the right size and does not have to be adjusted to fit. In addition, the fixed wrench does not damage the bolt or nut provided the wrench is in good shape and not bent or worn out.

The careful selection of sets of wrenches for the work done in the shop and the use of a wrench board or other contrivance so that the wrenches can be quickly picked out by the mechanic will result in an astonishing decrease in the time on the various jobs.

In selecting the right sizes of wrenches, a study of the design of bolts, nuts and

cap screws should be made. Various standards are in effect in the design of these parts and the heads of bolts and cap screws bear certain proportions to the diameter, unless they are made a special size. Table A shows the proportions from the smallest to the largest, and while the list runs to sizes larger than are used in automobile practice, there may, perhaps, be times when these larger sizes would be used in some other connection around the shop.

The openings in wrenches to fit these various heads are milled out 1/64 in. larger for clearance, and this amount will be sufficient for all finished heads, but in the case of rough or unfinished nuts the clearance may not be enough. However, there are few unfinished nuts used on an automobile or truck, and the few cases that do require using a wrench can be attended to with an adjustable wrench.

Wrenches of a fixed size are made in

a great variety of types, models and sizes. The wrench most used in the shop is the double head wrench with the heads at an angle of either 15 or 22½ deg. As a general rule, the two ends have milled openings of different sizes, the larger one fitting the bolt or cap screw, the size larger than the smaller end.

These end wrenches are usually finished in three standard finishes—unfinished, semi-finished and finished. The unfinished have the opening milled out only. The balance of the wrench is just as it comes from the press, except that the sharp edges are ground off and the handle made smooth. The semi-finished has the heads ground and finished in addition to having the opening milled out, and the handle is smoothed up. The finished wrench is ground and finished all over, the heads usually being left bright and the handle given either an oxide finish or coated with some kind of a durable

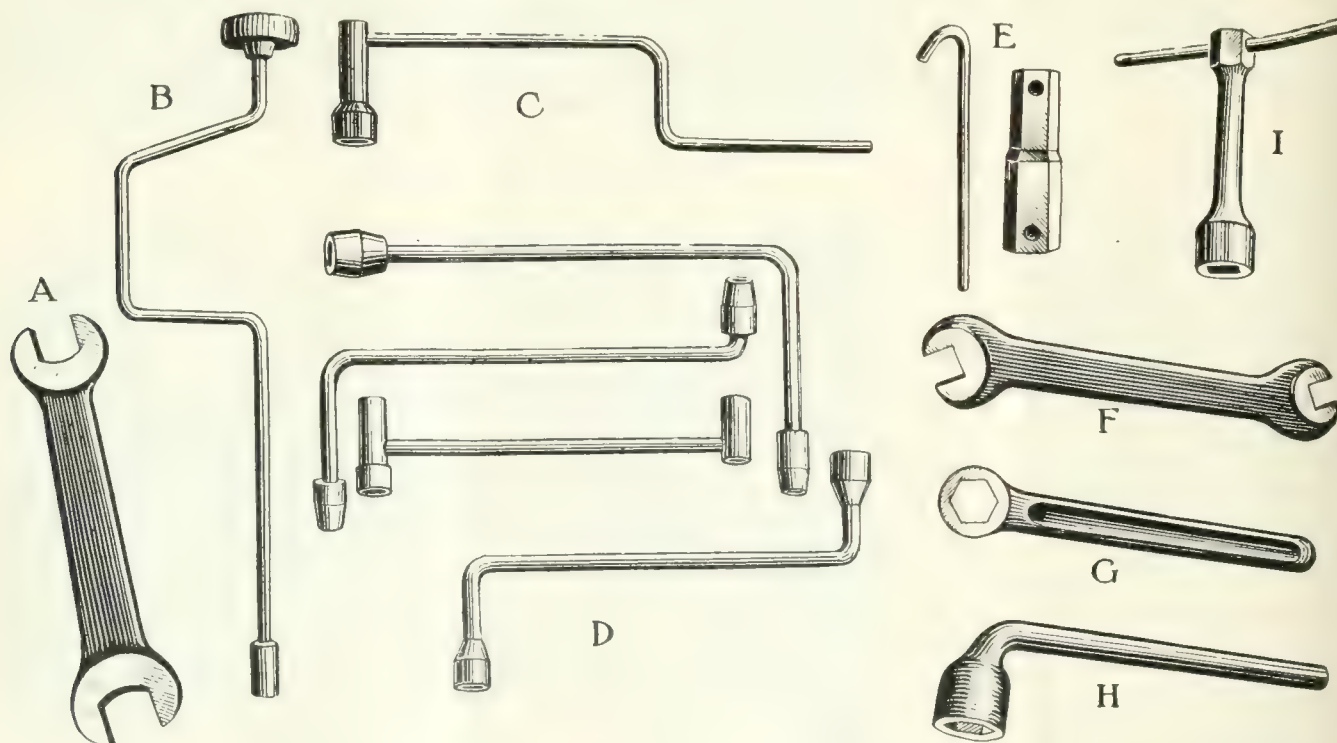


Fig. 1—Types of solid and socket wrenches. A—Angle and solid wrench; B—Speed wrench; C—Special socket to get at otherwise inaccessible nut; D—L socket wrench; E—Spark plug wrench; F—Set screw wrench; G—Hexagon box wrench; H—L socket wrench; I—T socket wrench





Fig 2—Monkey wrench



Fig. 3—Pipe wrench

varnish. The size of the openings is usually stamped on each head and the figures give the nominal size openings; that is, in the case of a wrench marked  $\frac{1}{2}$  in. the actual opening would be  $\frac{1}{64}$  in. larger than  $\frac{1}{2}$  in. or  $\frac{33}{64}$  in.

It is possible to get sets of wrenches covering all sizes of bolts, nuts and cap screws U.S.Std. and S.A.E. On many

cars there are special sizes of bolts, nuts and cap screws, and modern wrench makers are studying these conditions and are able to supply sets to fit all the bolts, nuts and cap screws on each of the different makes of cars. In selecting wrenches, angular wrenches are much to be preferred to straight wrenches, because by replacing the head the wrenches can be used on work that would be inaccessible to a straight wrench. There are many bolts and nuts on an automobile which have so little clearance that the end wrench cannot be used except, perhaps, by standing it up on its head. In such cases the socket wrench can almost always be used because the thickness of the socket is very little, and as long as there is clearance for the nut to turn around and a little more, there would also be enough clearance of the socket. The socket wrenches come in sets covering a large variety of sizes, and either in



Fig. 4—Steel handled monkey wrench



Fig. 5—Adjustable end wrench

hexagon or square; and when they are purchased by the set, there are extension, socket, universal joints and other devices which assist very materially in getting at close work.

A modification of the socket wrench is seen in the speed wrench, which is simply a socket wrench with a one-piece handle in the form of a brace. Of course, one of these sockets will fit only one size bolt or cap screw, but the great speed in putting on nuts or taking them off is responsible for reduction in time on many jobs.

TABLE A

Sizes of Bolt Heads, Cap Screw Heads and Nuts

Diameter	U. S. Standard			S. A. E.
	Hexagon Cap Screw	Square Cap Screw	Bolts and Nuts	
1/8	5/16	..	5/16	..
3/16	3/8	..	13/32	..
1/4	7/16	3/8	1/2	7/16
5/16	1/2	7/16	19/32	1/2
3/8	9/16	1/2	11/16	9/16
7/16	5/8	9/16	25/32	5/8
1/2	3/4	5/8	7/8	3/4
9/16	13/16	..	31/32	7/8
5/8	7/8	3/4	1 1/16	15/16
3/4	1	7/8	1 1/4	1 1/16
7/8	1 1/8	1 1/8	1 7/16	1 1/4
1	1 1/4	1 1/4	1 5/8	1 7/16

TABLE B

Milled Openings of Wrenches and Nuts and Heads They Will Fit

Opening	U. S. Standard			S. A. E.	Machine Screw Nuts
	Hexagon Cap Screws	Square Cap Screws	Bolts and Nuts		
1/8	..	..	..	..	No. 0
5/32	..	..	..	..	No. 1
3/16	..	..	..	..	No. 2
7/32	..	..	..	..	No. 3
1/4	..	..	..	..	No. 4
5/16	1/8	..	1/8	..	No. 6
11/32	..	..	..	..	No. 8
3/8	3/16	1/4	..	..	No. 10
13/32	..	..	3/16	..	..
7/16	1/4	5/16	..	1/4	No. 12
1/2	5/16	3/8	1/4	5/16	No. 14
9/16	3/8	7/16	..	3/8	No. 18
19/32	..	..	5/16	..	No. 20
5/8	7/16	1/2	..	7/16	..
11/16	..	..	3/8	..	..
3/4	1/2	5/8	..	1/2	..
25/32	..	..	7/16	..	..
13/16	9/16	..	..	..	..
7/8	5/8	3/4	1/2	9/16	..
15/16	..	..	..	5/8	..
31/32	..	..	9/16	..	..
1	3/4	..	..	..	..

TABLE C

Machine Screw Nut Sizes			
Number	Hexagon Nut Size	Number	Hexagon Nut Size
0	1/8	8	11/32
1	5/32	10	3/8
2	3/16	12	7/16
3	7/32	14	1/2
4	1/4	18	9/16
5	9/32	20	19/32
6	5/16	24	11/16
		30	25/32

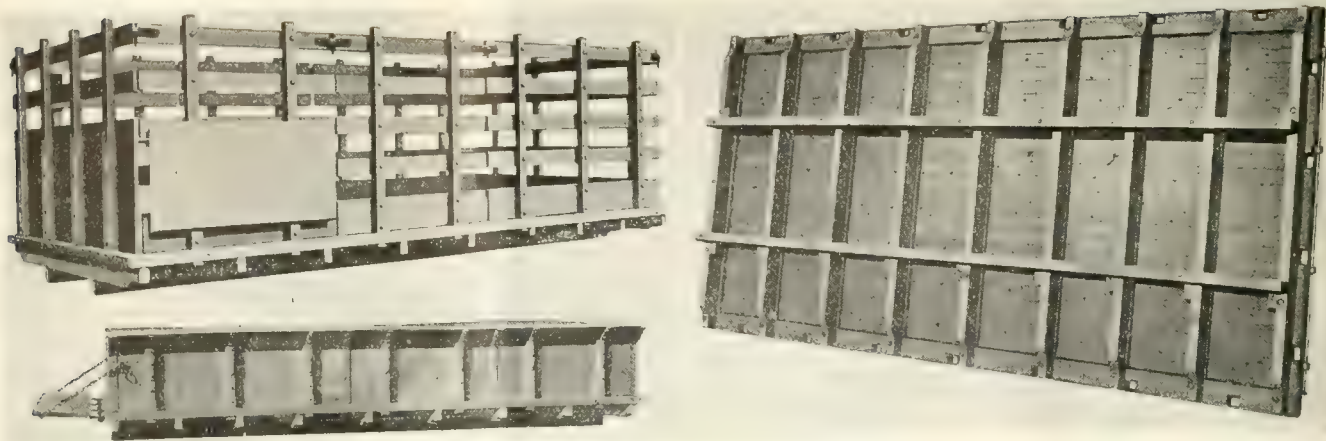
Another variety of the socket wrench is one with the "L" and "T" handle used generally to break the lock on the nut, previous to using the speed wrench.

Another type of wrench, not used so much in automobile work, is the box wrench, which is very much like an end wrench except that the milled opening completely surrounds the bolt or nut instead of taking only two sides, as in the case of the end wrench.

Monkey wrenches are made in sizes from 6 in. up, and with a great variety of handles, heads and shafts. The principle of the monkey wrench is one fixed jaw at the end, with an adjustable jaw on the other side which is moved by a screw operated by a knurled nut at the lower end. Monkey wrenches, as a rule, have wooden handles to allow of more comfortable handling, but a number of small ones, especially those used in the tool kit, have simply a metal handle, and are really large bicycle wrenches.

Pipe wrenches are not used for turning square or hexagonal stock, but are used on pipes, bars and rods. The two jaws have a wedge shaped opening between them, and the teeth are set at such an angle that they grip the rod firmly, and the greater the pressure the harder the rod is forced into the wedge shaped opening.

Note: Set screw heads are the same size across the face as the diameter of the screw. Therefore a  $\frac{3}{8}$ -in. set screw would take a wrench with a  $\frac{3}{8}$ -in. milled opening.



Views of the Simplex truck bodies, showing the construction also of the platform which is the base for all the body types

## Simplex Bodies Standardized

### Are Adjustable to Fit Any Width of Chassis Frame

THE platform is the base for all Simplex standardized truck bodies. It is built in 10, 12, 14 and 15-ft. lengths, and 5, 5½, 6, 6½ and 7-ft. widths.

The body is adjustable to fit any width of chassis frame. The cross members are 5 in. deep and 2¼ in. thick. In every other part, the same ample proportions are used.

Wear strips are optional and when used they are bolted to the floor. Other equipment includes pressed steel stake pockets.

The stake sections are 48 in. high, standardized so that they will fit any platform. The signboard is optional. The panel sides, 17 in. high with 9 in. 45 deg. flareboards are in removable sections.

The length and widths of the Simplex bodies are the inside measurements of the panel side body. The platform is 5½ in. wider and 3¼ in. longer overall than the nominal sizes. When the stake sections are used, the length only is decreased 1¾ in.

The maker is the Simplex Mfg. Co., Conneautville, Pa.

Two body types for farm and road construction work

### Dumping Body with Rear or Side Chute

THE Highway Commission of New York has designed and placed in service a uniform truck body which is to be used on highway work throughout the State.

In order that the body may be used for side or end dumping it is mounted on a hydraulic hoist. A platform body for hauling asphalt or other materials in barrels, can be easily formed by removing the side sections entirely. These may be removed singly, also, to permit of the dumping of rock or sand in various sized piles as may be required. The body is 12 ft. in length and 6 ft. in width.

An opening provided in either side of the endgate receives an adjustable chute

which makes it possible to deliver stone or sand at the side of the road. A sliding door operated by a hand lever situated below the center of the endgate provides the opening necessary for the admission of the chute. After removing the chute and raising the endgate the load of rock may be dumped in the middle of the road where required.

### Electric Vacuum Street Sweeper

THE Ohio Municipal Equipment Co., after several years' experimenting, has developed a machine that is now being offered to municipalities in two standard sizes, viz., of 8 ft. 6 in. and 4 ft. 6 in. widths.

All operations are by electricity, which is generated on the machine, this including power to propel the machine, operate the exhausters and manipulate the revolving brush. There is a separately controlled motor for each service, so that the suction at the point of pick-up and pressure at the back of the brush, which are created by the exhauster, can be regulated to suit the condition of the street, as can also the speed of revolution of the brush.

The points of advantage claimed for this sweeper are:

It works rapidly and without dust.

Street sprinkling and flushing are entirely eliminated.

No dirt or refuse is handled by the exhauster.

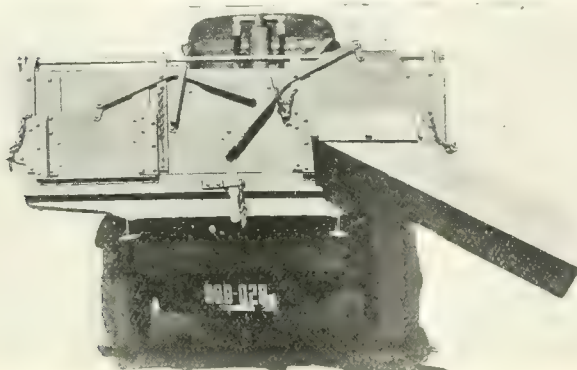
The machine does not dump dirt on the streets or visit the dump.

It sweeps at 3 to 5 m.p.h. and travels 12 to 15 miles to and from the working area.

It is quiet in operation, sanitary and hygienic.

### Operating Costs

Based on a \$14,000 list price of an 8 ft. 6 in. sweeper, the machine operating 5 m.p.h., 16 hr. a day, and gasoline at 31 cents per gal., the cost is \$21.17 per day. The cost per 1000 sq. yd. cleaned is 10 2/3 cents.

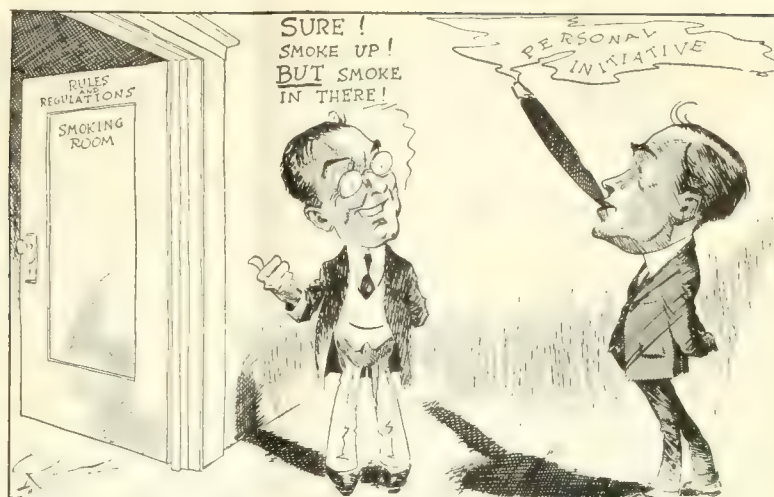


This body may be used for side or end dumping. It is mounted on a hydraulic hoist



# Do You See the Difference?

By  
Sinclair Gluck



OLD Silas Gunther, president of the town's biggest commercial house, was not smiling this morning. His men called him Old Hammerhead, because of his gift for hitting the nail on the head in his talks with them. But this morning the name fitted him even better, for he looked dangerous.

Parsons, a new driver, pushed open the door of his office and came shambling in. Almost immediately the old man's face lost its truculent expression.

"Come and sit down, Parsons," he said. "I suppose you know why I sent for you?"

The driver swallowed and cleared his throat. "Yes, sir, I suppose you're going to fire me, but"—

The man paused, but Old Hammerhead did not help him out at once.

Then—"But what?" inquired the old president.

The answer came in a rush: "I was going to say I don't care, sir. But I do care. I don't want to lose my job here and I don't see that I've done anything to deserve being fired. I did what I thought was right, that was all."

Old Hammerhead smiled suddenly. "I know it," he rapped out. "And I'm not going to fire you, see? But I'm going to have a talk with you, Parsons, because you got us into a nice pickle and narrowly escaped serious injury yourself, just by not thinking what was right, quite far enough!"

"Well, sir, I didn't know"—

Old Hammerhead raised his hand. "That's just the point, Parsons, you didn't know. However, you had better go ahead and tell me what happened!"

Parsons sat down, hesitated, and then cleared his throat, nervously. "Well, sir, I guess you know about what happened. When I was out on that long Hobb's Ferry run last week I noticed that the steering gear on my bus seemed to be loose. So I stopped and got down to have a look at it. And I found that a nut on the end of one of those little arms on the steering gear was loose and pretty near ready to drop out."

Old Hammerhead nodded. "You mean a nut on the end of one of the ball and socket joints that connect the steering knuckle arms with the tie rod?" he asked.

Parsons stared at his employer in surprise. "Yes, sir, I guess that's right. It was what you say."

Old Hammerhead laughed. "All right, go on, Parsons."

"Well, sir, I saw that this nut was just about ready to drop out, so I got a wrench and screwed it in again, grease cup and all."

"Then what did you do, Parsons?"

"Why, I didn't do anything, sir. I thought it would be all right, so I drove off and forgot about it. I had screwed it up good and tight."

"Well, then, what happened yesterday?"

"Why, yesterday morning, when I started out, everything seemed to be all right. And then when I was going down that long hill into Brookville I gave a couple of sharp pulls at the steering wheel to avoid some bumps. Well, sir, the next minute I heard something clanking and banging around the front wheels, the bus gave a lurch and I found that the steering wheel wouldn't work. I could turn it, but it wouldn't steer at all. I shut off the engine and put on the brakes, but the bus veered over to the side of the road and before I could stop her altogether we were into the ditch and I was on my head with the bus upside down and on top of me."

Old Hammerhead nodded. "And a mighty lucky escape you had, Parsons!"

"Yes, sir. Well, then I crawled out and phoned the garage, and later on the wrecking car came along, turned my bus over and pulled it out of the ditch. The bus herself wasn't hurt much, sir. But the load of furniture was kind of bent up."

"And what was the cause of the fault in the steering gear, Parsons?"

The young driver's face grew a little longer than before, if possible. "Well, sir, Mr. Ross says that that same nut must have come out, because that end of the drag link was trailing loose."

Old Hammerhead straightened up in his chair. "Exactly, Parsons. Now, I'll tell you what happened. There's a little cotter pin that holds that plug in place at the end of the ball and socket joint. And the plug in turn holds the spring in the joint and that holds the socket in place. But when you screwed in the

plug you forgot or you didn't know about the cotter pin. So you didn't put in a new one and you didn't report the trouble and give somebody else a chance to put in a new one. The result was an accident that might have cost your life.

"Now, Parsons, that's the trouble with doing somebody's job for them. And that's the thing I want to bring home to you. You undertook to take care of something that I hire mechanics to take care of. You came here and found yourself part of a carefully thought out system to take care of the trucks and you took it to yourself to disregard that system and do something that somebody else was better qualified to do—and that somebody else was supposed to do. That would not have been so bad if you had known how to do it. But you didn't. You made a mess of it."

"But I thought it would be all right—"

"Exactly. You thought it would be all right." The old man interrupted. "You thought it would be all right to disobey orders. And it wasn't all right."

"You have careful instructions, not only on your daily card but verbally from Ross, to report anything that goes wrong with the truck as soon as you get in—and to report any temporary repair you may make. But you didn't do it. You thought your repair would do—and it didn't do."

"I'm not complaining about the fact that you screwed the nut in again. That was right—although if you had looked carefully you probably would have seen the cotter pin hole. But what I do complain about is the fact that you didn't report the trouble. That's what caused the accident—not your repair."

The young driver moved in his seat. "Yes, sir, I suppose that's right. But you said the other day that it was a good thing to do more than your share—and I thought"—

"That's just the trouble, Parsons. You didn't do all of your share. You made a repair and then forgot all about it. And I don't want you to do anybody else's work when you have to disobey orders to do it. Do you see the difference?"

"Yes, sir, I do now. I guess a fellow ought to use his own initiative—but stick to the rules, too!"

# "I Care for It Myself"

## \$5,000 a Year from a Second-Hand Truck

### Interesting Cost Analysis Showing How Personal Care Reduces Maintenance and Increases Business

THIS is the cost story of a second hand truck. It is interesting because it illustrates the fact that daily care will greatly reduce costs. It also shows how at least one up-to-date fleet owner knows exactly what his truck is costing him to operate and exactly how much profit he is making on it.

The truck is owned by Frank Sattler of the Frank Sattler Storage Co., Pittsburgh, Pa. In Mr. Sattler's own words:

I am operating this Selden and a smaller truck of another make in the general hauling of bulk material. The Selden hauls coal for about 5 months each year and gravel and sand for another 5 months. The remainder of the time it hauls a variety of loads, such as dirt and clay.

This Selden was 1½ years old when I bought it in 1918. The original owner was afraid to run it any longer because the engine bed casting had been cracked in an accident.

I bought the truck, had it overhauled and the cracked casting welded, equipped it with a hubodometer, fire extinguisher and a lighting system. In this way I got the whole truck, including welding, overhauling and special equipment for about half the price of a new truck. The casting is as good as new and the truck has given me almost no trouble, although it is nearly 4 years old.

### What Care Can Accomplish

Up to 2 weeks ago, I had not even opened up the engine or the crankcase. Then, out of curiosity, I took the crankcase off and looked at the bearings. I found that they were just as good as the day they were originally installed. It was not even necessary to adjust the shims on the connecting rod bearings.

This is due partly to good construction and material and partly to the fact that I have taken exceptionally good care of the truck. I average 1¼ hours each evening, looking over the truck and tightening it up. In working out my repair charges, I have estimated this time at \$1.25 per hour.

Every 6 months I inspect the rear end, take the caps off and put in new grease. I do the same to the transmission every 2 weeks—or oftener if the truck is running a great deal. Every 2 months I wash the engine out and put in new oil.

I use a gallon of oil regularly every

day, although I am averaging only 40 miles per day. This is more than the quantity used by the average owner, but I figure that it pays, because it insures me against burnt-out bearings. As a matter of fact, I have had no bearing trouble since I got the truck.

### Pointers on Making Profits

One of the greatest obstacles to profitable motor truck operation is careless driving. For this reason, I drive myself, unless I can get a dependable man to handle the truck.

The Commercial Vehicle—Truck Cost System			
28 Months ending <u>Nov 30</u> 1920			
Make of truck <u>Selden</u>		Gasoline <u>Electric</u>	
MONTHLY COST SUMMARY SHEET U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline	8400 gals	@ \$ .30	\$ 2520 00
Current	kw h	@	
Oil	2520 qts	@ \$ .17	428 40
Grease	lbs	@	
Kerosene	gals	@	
Waste	lbs	@	
Dist. Water	gals	@	
Driver	630 days	@ \$ 6	3780 00
Helper	days	@	
Mechanic	hrs	@	
<b>A—Total Operating Charges</b>			<b>\$ 6728 40</b>
<b>Maintenance Charges</b>			
*Tires	25200 miles	@ \$ .0624	\$ 1572 48
Repairs			
Overhauling, painting, etc.	Estimated		1199 19
Spare vehicle rental			
Garage rental (pro rata)	@ \$20 per month		560 00
<b>B—Total maintenance charges</b>			<b>\$ 3331 67</b>
<b>Fixed Charges</b>			
Insurance	hrs	per year	
Liability		per year	
Collision		per year	
Interest	6	@ \$137 19 per year	320 11
Depreciation on chassis		@ \$ .0345 per mile	869 40
Depreciation on body			
Depreciation on equipment			
*Depreciation on tires			
Total taxes and licenses	@ \$50 per year		116 67
<b>C—Total fixed charges</b>			<b>\$ 1306 18</b>
			<b>11366 25</b>
*Note: Omit one of these			

Above are the costs on the second-hand Selden for a period of 28 months, estimated and pro-rated for that period. They are laid out on sample sheets of The Commercial Vehicle Standard Cost Keeping System for Motor Trucks. The charge for repairs includes many hours of the owner's time and \$421.88 of this item goes back into the owner's pocket as also does a large part of the item for driver's salary. The owner often drives himself



I am very careful never to load the truck excessively, nor to run above the rated speed. These precautions are specially necessary in Pittsburgh, on account of the very poor roads, the bad hills and the heavy traffic. The truck has no governor, but I run it slowly whenever I strike a bad stretch of road. Coasting is a dangerous practice that I never indulge in.

Although the Selden pulls well in winter and can be operated successfully during the worst season, I figure that it does not pay to take the truck out if the snow is very deep. That is why the truck operates only 270 days in the year. I believe that I can make more money on this basis than I could if I took the truck out regardless of operating conditions.

It has also been my experience that the long haul does not pay as well as the short one in my work. This is be-

cause, on the long trips, the truck runs into poorer roads and this increases the

What the System Costs

On these two pages are shown filled-in sample sheets of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets, is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

How the Costs Work Out

The regular rate for my truck is \$35 a day, although this varies considerably. On some days I make less. On others, I make as high as \$80. The average, per day worked, for the entire year is \$30.

In many cases the truck is loaded by a chute. When it is necessary to use hand loading, the shovellers are supplied by the contractor for whom I am hauling. The truck has a dump body and the loads are always discharged by dumping. It averages 6 trips a day and carries an average load of 8000 lb.

In the 28 months ending Nov. 1, 1920, the truck worked 630 days and traveled 25,200 miles. The operating costs for the period were \$18.04 per day, 75 cents per ton, 45 cents per mile and .2255 per ton-mile.

My repair charges have been only \$41 so far, but I am figuring \$150 a year hereafter, on account of the truck's age. I am also charging in an hour and a quarter of my time every evening, at \$1.25 an hour. I am depreciating the truck on a minimum life of 55,000 miles.

Profits from the Truck

The daily income of \$30, minus the daily cost of \$18.04, leaves a net profit of \$11.96 per day. For the 270 days a year operated, this amounts to \$3,229.20 a year.

But in figuring my total income from the truck, I add the \$421.88 charged as repairs, which I earn in the evenings, working on the truck. This gives me a total of \$3651.08 a year, in addition to what I earn when I drive the truck myself, at \$6 per day. Altogether, my net income from this one truck is about \$5000 a year.

I operated horses for 20 years and usually had between 10 and 14 head. I have found it much easier to make money with trucks, because they give better service.

As an example of this, take a recent job, where the contractor was excavating for a cellar. With 6 men loading dirt on the truck, my Selden made 7 trips a day, a total of 56 miles, and carried 5 cu. yd. at a trip.

Since the dirt was being thrown right out on the main street, it was necessary to keep removing it as fast as it was thrown out. The truck could leave on its last trip at 4.45 and thus enable the men to work right up to 5 o'clock, without leaving a great deal of dirt on the street.

Better Service Too

When haulage contractors make bids for such jobs, the first question is: "How fast can you take away the dirt?" By having a fast, dependable truck, I have been able to make good promises on such work and keep them, so that my haulage business has been doubled.

The complete costs for the period are shown on these pages.

The Commercial Vehicle—Truck Cost System

Number of Truck 1  
Capacity in lbs. 7000 Chassis No. \_\_\_\_\_

MONTHLY COST SUMMARY SHEETS

U. P. C. BOOK COMPANY, INC. 241-249 WEST 39TH ST. NEW YORK

Investment	
Cost of <del>body</del> <u>body</u> <u>Second hand</u>	\$ 1 738 30
Cost of <del>body</del> <u>Cab</u>	125 00
Cost of equipment <u>Odometer, lights, etc</u>	36 50
Cost of tires	386 70
1—Total cost, complete	\$ 2 286 50

Performance Record

2—Days operated	630
3—Days idle	222
4—Days maintained (Item 2—Item 3)	852
5—Total hours operated	5040
6—Total miles covered	25200
7—Total trips made	3780
8—Total tons or packages or stops	15120

Performance Averages

9—Average miles per day maintained (Item 6—Item 4)	29.57
10—Average miles per day operated (Item 6—Item 2)	40
11—Average miles per trip (Item 6—Item 7)	6.67
12—Average tons, <del>stops or packages</del> per trip (Item 8—Item 7)	4
13—Average commercial ton-miles, <del>package miles or stop miles</del> per trip (Item 11 x Item 12) / 2	13.33

Recapitulation

14—Total expenses for month (Sum of Items A, B and C)	\$ 11,366.25
15—Cost per day operated (Item 14—Item 2)	18.04
16—Cost per day maintained (Item 14—Item 4)	13.34
17—Cost per mile operated (Item 14—Item 6)	.451
18—Total commercial ton-miles, <del>package miles or stop miles</del> (Item 7 x Item 13)	50400
19—Cost per commercial ton-mile, <del>package mile or stop mile</del> (Item 14—Item 18)	.2255
20—Cost per ton (Item 14—Item 8)	\$ .7517

The investment, performance record, performance averages and recapitulation on the 3½-ton Selden. The truck operated only 630 days in all and covered a total of 25,200 miles. The total costs were \$11,366.25, which gives a cost of \$18.04 per day operated, \$0.45 per mile operated and \$0.75 per ton. The cost per ton-mile was \$0.2255. The truck earned an average of \$30 per day operated and paid the owner about \$5,000 a year

# The Better Way

## To Save Time in Truck Repair and Maintenance

### No. 542—Clearing Fuel Piping Without Removing Parts

A SIMPLE method of clearing gasoline piping of obstructions without removing the parts is shown in the accompanying illustration. This consists of entirely filling the tank with gasoline, that is, the tank must be filled until the gasoline overflows the filling spout to get rid of any pockets of air. Screw the filling cap on tight and plug the vent hole with a piece of wood driven in. Strike the tank a sharp blow with the fist or a mallet. The pressure from the blow is exerted equally in all directions and the obstruction in the pipeline being the point of least resistance will be dislodged. This method will start gasoline flowing under any conditions where the pipe can be opened with air pressure.—W. TODD, Chicago.

### No. 543—Vise Block for Preventing Work Dropping

DIFFICULTY is often experienced when working with a vise in keeping the piece secure, especially when any hammering or riveting is being done. This is exasperating especially during a repair period when time is valuable. A wooden block made to fit the vise under the jaws will solve the problem. This prevents work from dropping when there is any hammering or riveting to be done to it.—S. E. GIBBS, Croydon, Iowa.

### No. 544—Starting a Nut Over a Spring

WHERE a nut is to be started against a spring, a nail is pushed through the spring and then through the cotter pinhole in the stud. By turning the spring in a clockwise direction it will compress itself against the nail and the nut can be started.—J. H. CHANES, La Jara, Col.

### No. 545—Removal of Broken Cylinder Head Bolts

ONE of the occasional troubles which the repairman encounters is a broken cylinder head bolt. These broken segments are usually tightly imbedded in the cylinder block. The best method of removal is to drill out the part without running the drill into the thread and then remove the shell of the drilled out portion.

This permits of using the same size bolt and does not require retapping for a special size of bolt with the additional drilling of the cylinder head. To drill

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

the bolt out it is advisable to use the head as a jig and slip a small bushing into the bolt hole, then drilling through this bushing. This avoids the drill running offside and cutting into the thread. After a hole about  $\frac{1}{4}$  in. in size is drilled into the hole a specially twisted tang of a file is used to extract the shell of the thread.

This twisted tang on the file is a special left hand twist made by heating the tang red in the forge and gripping the end in a vise and twisting while hot. The end is then filed down slightly over  $\frac{1}{4}$  in. in diameter and tempered. The harder this tool is turned and deeper it imbeds itself in the hole, the tighter it grips. This is as handy a tool as the mechanic could require for the purpose of removing broken off studs.—A. HELDRIGEL, Summit, N. J.

### No. 546—Washer on Funnel to Prevent Tipping

THE tipping over of the funnel while filling the gasoline tank or pouring oil into the engine through breather pipes results in loss of oil unless funnel is held with one hand, in which instance the person pouring is under a handicap. A simple modification to the funnel con-

sists in soldering a large washer over the spout as is indicated in the accompanying illustration. With the washer secured to the funnel it will rest upright on the gas tank opening or on the breather pipes, permitting the use of both hands for tipping the oil can.—V. LEMON, New York City.

### No. 547—Piston Ring Gage in Repair Work

WHERE one size and make of truck is worked on it is more convenient to have a gage made the exact size of the cylinders than to fit the rings directly in the cylinders. This gage can be made out of a piece of stock bored out to the size of cylinder.—A. G. RAABE, Long Island City, N. Y.

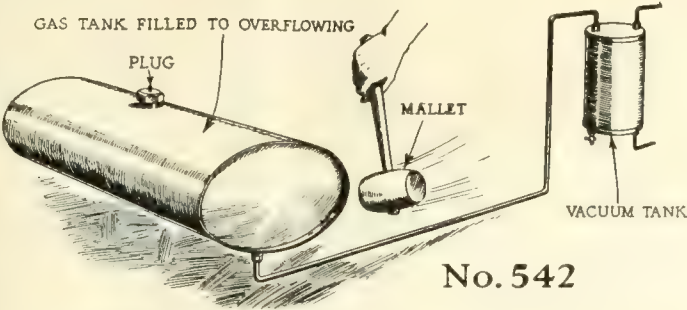
### No. 548—Battery Steamer from a Gas Burner

A BATTERY steamer can be constructed from a gas burner, a boiler and a hopper with a cooling coil, which is kept cold by cold water from the city supply. The distilled water runs out from the end of the coil which extends over the side of the hopper. The design is such that by the use of an old carburetor it is possible to control the height of the water in the boiler. When distilled water is wanted, the spigot at the top of the boiler is closed and the steam is forced back to the hopper. When it strikes the cool coil, it is condensed. To equalize the pressure in the carburetor, two pieces of small copper tubing are used to connect the boiler from the carburetor. A water glass connects the two pieces of tubing and shows the height of the water in the boiler.—C. D. RECORDS, Oroville, Cal.

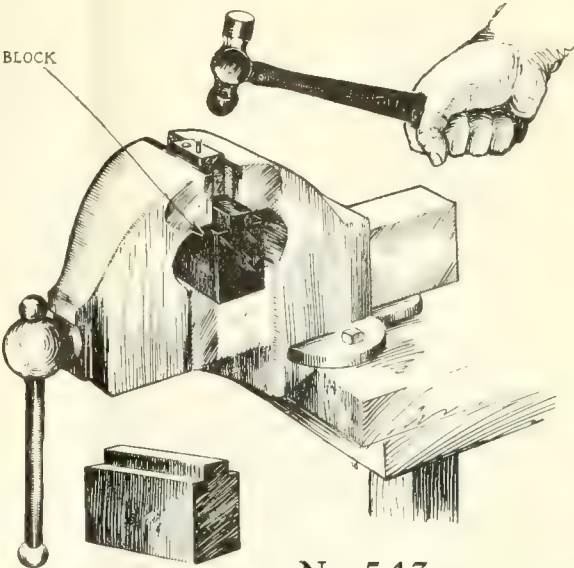
### Trucks Deliver to Restaurants

SAN FRANCISCO, CAL., Aug. 17—The problem of feeding more than 15,000 persons every day has been solved in San Francisco and Oakland, and of feeding more than as many more in Portland, Seattle and Tacoma, has been solved by the White Lunch Co., the largest chain of dairy lunches on the Pacific Coast, by the use of a fleet of trucks, the latest addition to which is a standard, one-ton Clydesdale truck. It carries an extra large body, and is equipped with side doors to facilitate handling the food supplies, which are distributed from a central commissary in San Francisco, and thence carried in trucks to all the twelve restaurants in that city and to the one in Oakland.

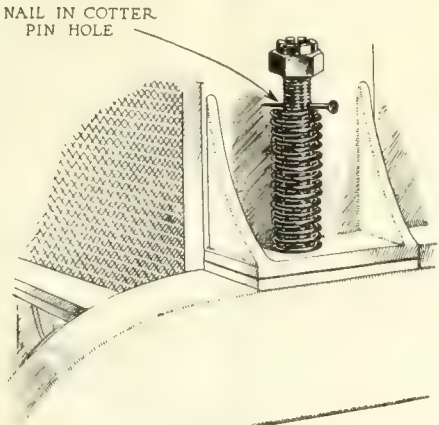




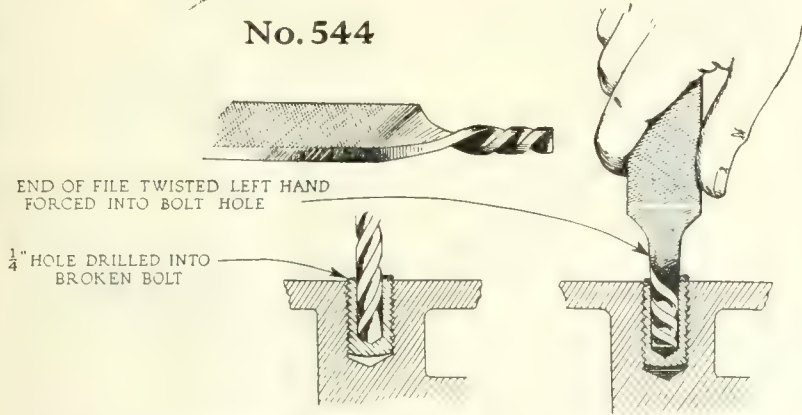
No. 542



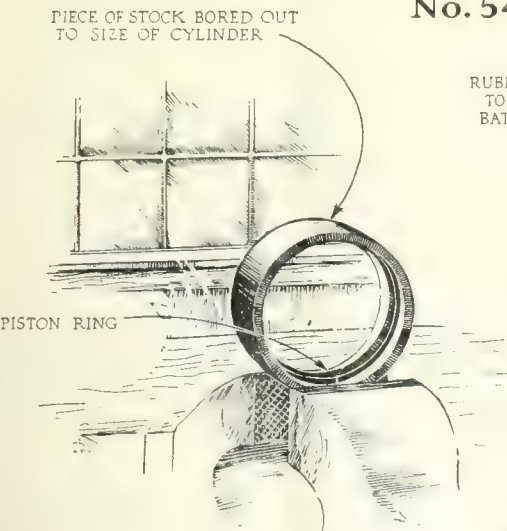
No. 543



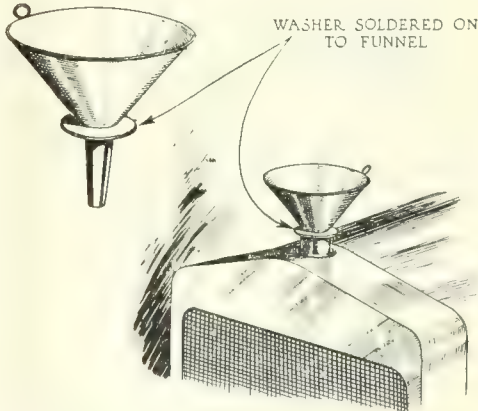
No. 544



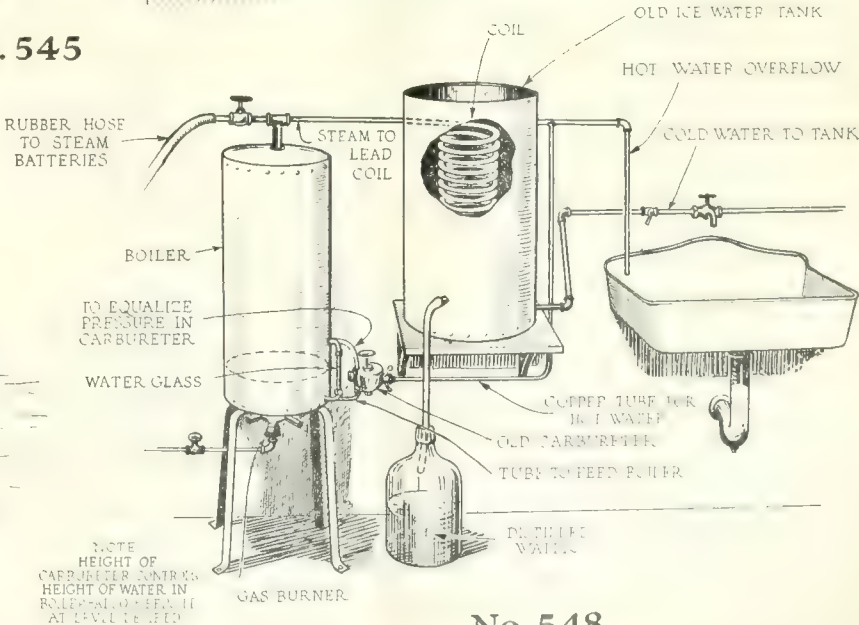
No. 545



No. 547



No. 546



No. 548

### No. 549—Stand for a Ford Driveshaft

A STAND for a Ford driveshaft is made by bolting the clutch plate to the floor beneath the opening of the pipe vise, which is attached to the wall as shown in the accompanying illustration. The square hole in the plate prevents the universal joint from turning.—H. A. KLINE, Sharon, Conn.

### No. 550—Adjustable Press and Puller

PRACTICALLY every shop has several heavy sledges which are used on every available occasion. This practice is not to be recommended as the resulting damage to parts is frequent and personal injuries occur when the sledge slips. The arbor press should be used if one is available or the conditions of the work will permit.

Most any truck shop will find an arrangement of press and puller as is shown in the sketch to have several desirable uses, and to prove a detail of shop equipment much more satisfactory and serviceable than the heavy hammer.

The fixture is portable and in consequence is useful in straightening frames, bumpers, pulling steering posts or pulling off wheels.

The frame is made so that it is readily clamped in a vise in either a horizontal or vertical position. The details of this tool consist mainly of the perforated steel plates forming the frame. This is  $\frac{1}{2}$  in. boiler plate and the holes are drilled for  $\frac{3}{4}$  in. bolts. The side frames are  $3\frac{1}{2}$  ft. long and 4 in. wide. The bolt holes are drilled 5 in. apart.

The cross braces consist of two sections of  $\frac{1}{2}$  in. plate each, 2 ft. long and 5 in. wide. The upper cross brace is fitted with a threaded hub, which can be turned down and threaded inside for this purpose. The lower brace has a similar center support but is not threaded. A drilled hole through this hub is about 2 in. in diameter which will accommodate the shafts while pressing off gears.

The screw is threaded to fit the upper brace, and is made from bar stock turned down from a steel axle about  $\frac{1}{2}$  in. in diameter. The width adjustability of the tool is of especial advantage and the parts are reversible so that the screw can be turned about and made to push where the parts are not too far apart.—M. C. H., New York City.

### No. 551—Lock for Gasoline or Oil Pipe Valve

A SIMPLE method for attaching a hinged hasp to an oil valve or turn off cock is shown in the sketch and serves its purpose by adding a padlock when it is desired to prevent tampering with the valve by unauthorized persons. The use of this method of locking a valve is not restricted to oil pipes and is equally as serviceable for air, water, gasoline, etc.

The part of the hasp with the "U" fastener is riveted jointly over the pipe with the screw end of the hasp. A bend

is made in the hinged part of the hasp to clasp over the handle of the valve. When not locked the hasp is thrown back leaving the valve free to be opened. To lock it the hasp is closed over the handle and the padlock snapped in place.—E. MCARDELL, New York City.

### No. 552—A Screwdriver That Does Not Roll

A SCREWDRIVER or other wooden handled tool is prevented from rolling off the bench by drilling a  $\frac{3}{8}$  in. hole offset from the center and filling with melted lead.—A. G. RAABE, Long Island City, N. Y.

### No. 553—Patching Breaks in Fenders and Bodies

WHERE a patch is placed on the under side of a broken fender or on the side of a body to mend a break in metal, the usual practice is to leave a conspicuous row of rivets outlining the patch secured to the under surface.

To avoid the evidence of patching from the surface the positions for the rivets should be indented by means of a conical punch as shown in the sketch, after the rivet holes are drilled jointed through the metal and the patch. Using copper rivets and a rivet set, the head is held by means of a flat steel block set flush with the metal. The head of the rivet is then tinned with a soldering bit, flowing the metal evenly about the rivet head and the crack is also closed up with a film of solder if at all open. Having completed this, a file is used to flush up the surface. Painting over this patched job conceals it effectively. The extra work required to complete this job, in comparison with prevailing methods, is small when results are compared.—A. CRAW, New York City.

### No. 554—Legs for Work Bench or Shelf

SUBSTANTIAL legs for supporting a small or large work bench can be made up readily from lengths of wrought

iron pipe as shown in the accompanying illustration. Two splits are made crosswise of the pipe and the metal turned out square to the body of the pipe. Where this is done at each end the pipe is then drilled and secured with lag screws making a neat and substantial support.

For shelf use the pipe is similarly split but the ends are turned to positions which correspond to the surface of the side wall and to the under surface of the shelf.—E. RAMSEY, Detroit.

### No. 555—File Rack for Wall Easily Made

THIS file rack is made of two pieces of light lumber with slots sawed in at an angle. These slots are of sufficient depth to hold files, and the rack is nailed to the wall.—C. R. PIERSON, Medina, N. Y.

### No. 556—Igniter for Oxygen Tip for Burning Carbon

TO overcome the necessity of dropping a piece of burning gasoline-soaked waste into the cylinders to start the oxygen tip or light it after it is extinguished, a serviceable method is to use four dry cells and a spark coil wired as shown. Wherever the tip of the oxygen pilot is brought in contact with the inside of the cylinders a spark occurs which instantly ignites the gas. With this method the tip is pushed around the inside of the cylinders and the spots of unburned carbon which invariably remain are reached and burned off.

A small switch in circuit is pressed with the finger to give current only when the flame is out. The tip coming in contact with the spark plug or valve port opening when the tip enters the cylinders will also ground the circuit, and this must be kept out of contact when making contact at the point of the tip.

The coil used need only be one of the type as used for gas lighting or jump spark ignition.—W. ANDRESEN, Franklin, Pa.

### If Callahan Could Do This, Why Can't Your Man?

BOSTON, Aug. 22—Charles W. Price, advocating motor safety at a meeting of the National Safety Council in Boston, told the following story that is worth while for all fleet truck owners.

In St. Louis Judge Mix determined to stop motor accidents and he put a penalty of \$500 on some of them. One big firm with thirty-one trucks had to hire a permanent attorney to represent its men before the courts because they were in trouble so often. Then came Safety Week, and a plan for teaching drivers at a school that was organized. Callahan, foreman for the trucking company, became interested, was made one of the officials of the school, and had all his drivers attend, where they were given talks on brakes, steering knuckles, etc., also the law of the road and street traf-

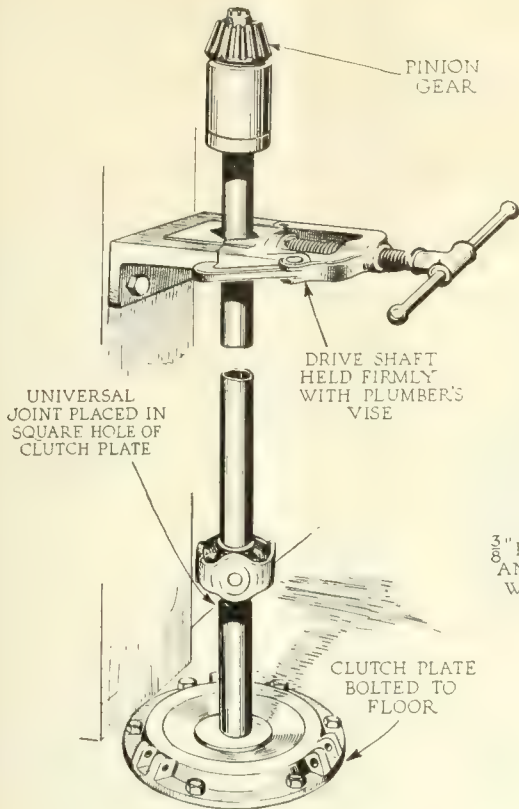
fic regulations. As a result of all this for upward of a year not one of the trucking company's men appeared in court, the attorney lost his job and the owners of the vehicles were saved thousands of dollars in fines and damage suits.

### Trackless Trolleys for Philadelphia

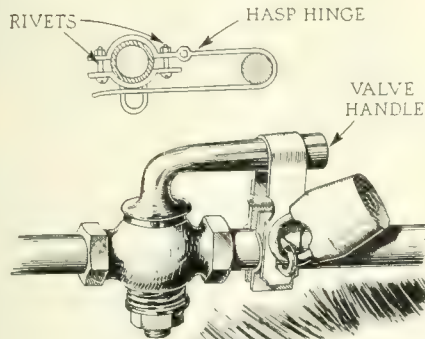
PHILADELPHIA, Aug. 16—Experimental "trackless" trolley cars are being made by a local concern for the Philadelphia Rapid Transit Co. and, it is expected, will be tried out here for a demonstration of their availability.

At the recent session of the Pennsylvania Legislature, a bill was passed authorizing street railway companies to operate vehicles without the use of rails or tracks, deriving their power from overhead wires. Governor Sproul has not approved this measure.

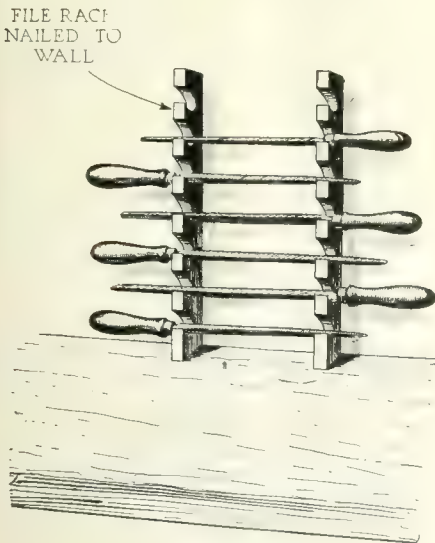




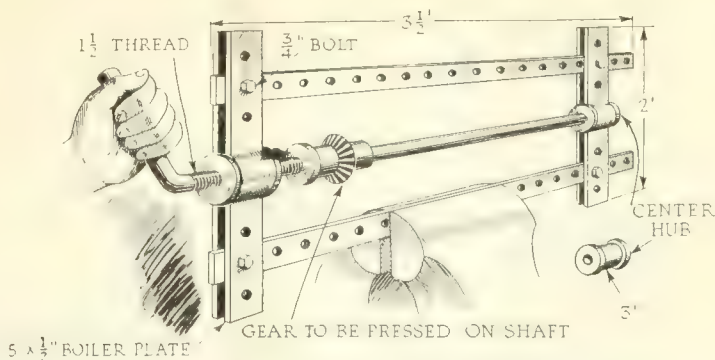
No. 549



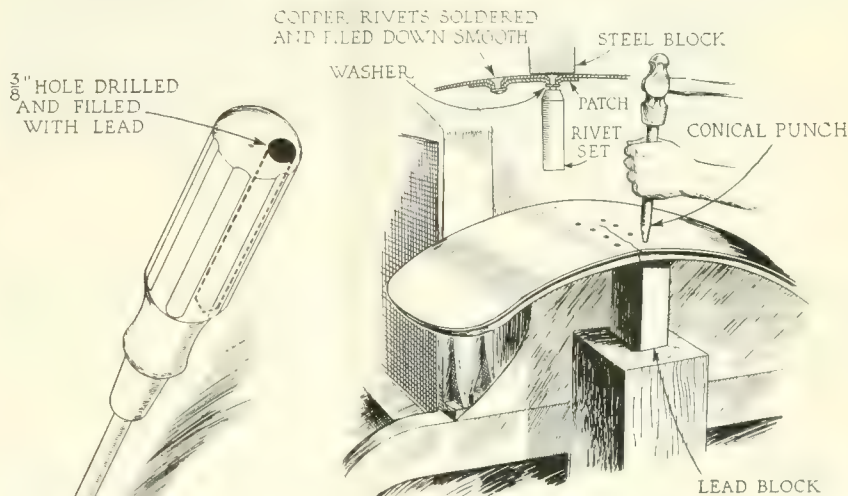
No. 551



No. 555

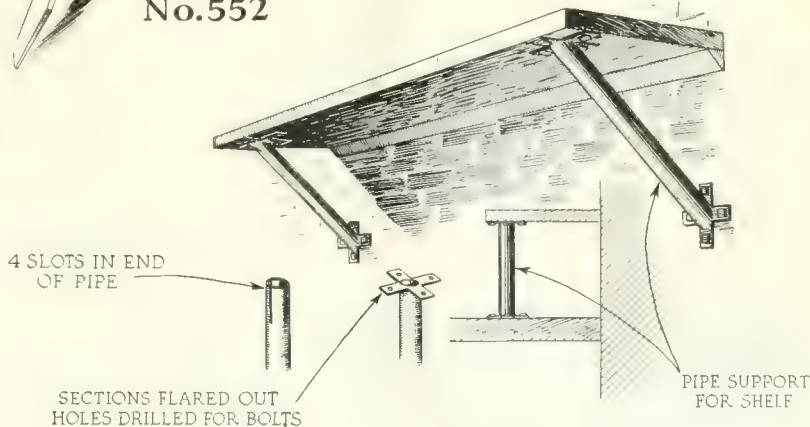


No. 550

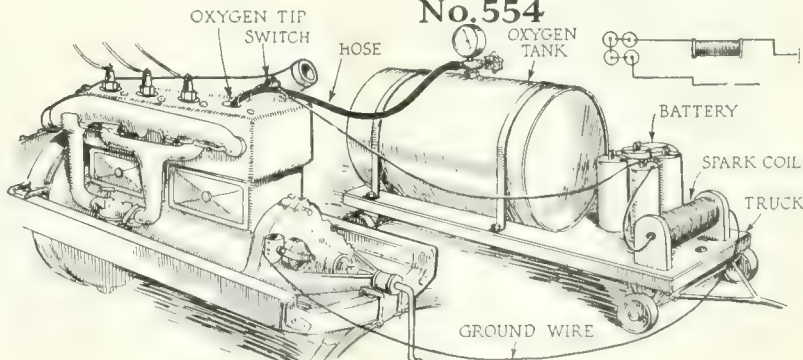


No. 553

No. 552

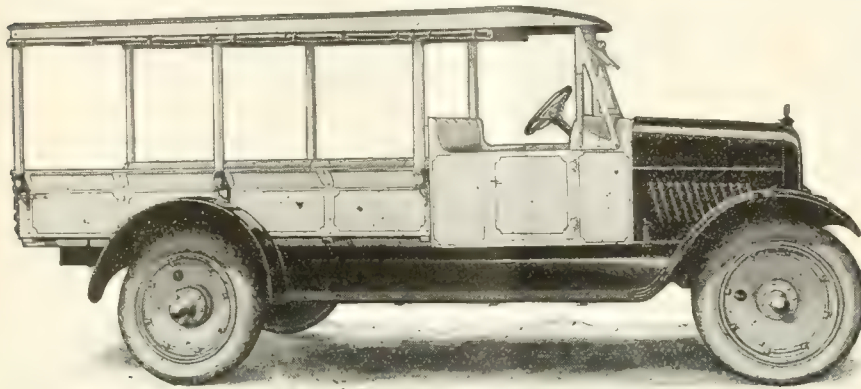


No. 554



No. 556

## Buyer's Department of The Commercial Vehicle



*New 1-ton six-cylinder Larrabee speed truck*

### Larrabee 1-Tonner Built for Speed

*Assembled with Well Known Units—35 M. P. H. at 1850 R. P. M.*

*—Fuel Economy Shown in Recent Test*

#### LARRABEE SPECIFICATIONS

Capacity, tons.....	1
Chassis price.....	\$1925
Wheelbase, in.....	138
Tires, front.....	34 x 5
Tires, rear.....	34 x 5
Bore, in.....	3 1/4
Stroke, in.....	4 1/2
N. A. C. C. hp.....	25.3
Speed, r.p.m.....	1850
Speed, m.p.h.....	35
Gear ratio in high gear.....	5.75
Final drive.....	Spiral bevel

A ONE-TON six-cylinder speed truck is the latest addition to the line of models to be built by the Larrabee-Deyo Motor Truck Co., Binghamton, N. Y. In a recent test run made by the engineer

of the company, this light model was driven to Buffalo, a total mileage of 208 in 7 hr. and 30 min., thus averaging 27.73 m.p.h. He did this with a load of 2385 lbs., the chassis and body complete weighing 3990 lbs. The total weight of the truck including load and driver was 6375 lbs. The total mileage of the trip from Binghamton to Buffalo and back was 575 miles. This was negotiated with a total use of 44 gal. of fuel, giving an average of 13 m.p.h. Water consumption was about 2 qts., and oil consumption 1 pint. The new truck, it is stated, has a speed of 55 m.p.h. with 2450 lbs. of dead weight, and can be throttled down very low on high gear. In a test, the engi-

neers were able to make from 2 m.p.h. to 30 m.p.h. within 50 ft.

The assembly consists of the following units: Continental engine; Savage frame; Fedders radiator; American Bosch ignition and lighting with Exide battery; Zenith carbureter; Brown-Lipe clutch and gearset; Salisbury spiral bevel rear axle; Sheldon springs; Gemmer steering gear; and Thermoid-Hardy Spicer universal joints. Pressed steel disk wheels of Indestructible design are used. Pneumatic tires are fitted all around.

The cylinders are cast in block with the valves placed at the right. Water is circulated by a centrifugal pump through a zig-zag tube type of radiator. Fuel is fed by gravity from a tank located in the dash. The engine is lubricated by a pressure system in which the oil is fed by pump to the bearings, cylinders, and through a drilled crankshaft to the crankpins, but is not splashed.

The clutch is of the multiple dry-disk type and the gearset, which is a unit with the engine, is selective with three speeds forward. The axle is of the three-quarter floating type. Both propulsion and driving torque are taken through the half-elliptic springs. The brakes operate on rear wheel drums, the hand brakes being of the internal type and the foot brakes, external.

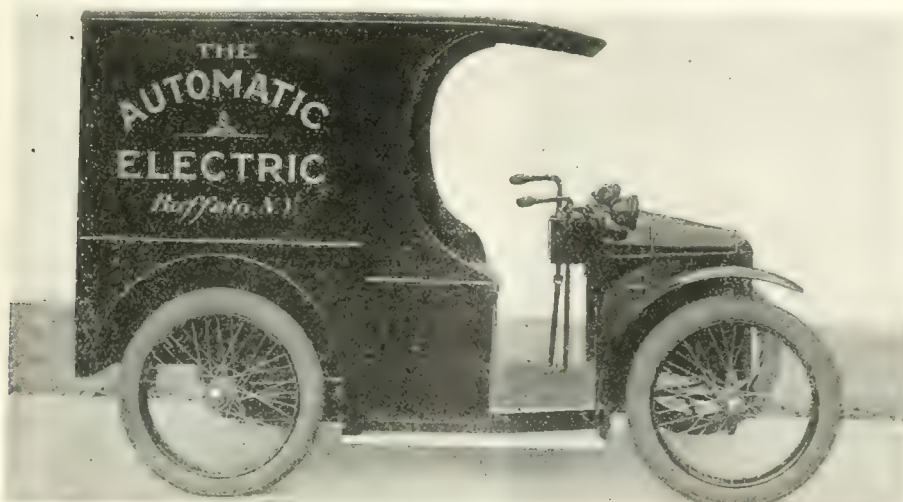
### Automatic Electric for Small Merchant

THE latest in the electric field is a small electric commercial car known as the Automatic Electric, manufactured by the Automatic Transportation Co., Buffalo, N. Y.

This vehicle is suited to the small merchant and retailer. It is a distinct advertising novelty and incorporates refinements and finish, making it suited to the haulage requirements of the floral, etc., trades.

Economy of operation is a feature claimed by the manufacturer. Practically the entire expense is the cost of charging the batteries, which is but a few cents per day, a complete charging apparatus being furnished with each vehicle at no extra cost.

This electric has a cruising radius of from 50 to 60 miles on one charge. Specifications include a 24-volt motor, Exide battery, drum type controller with three speeds forward and reverse, two brakes, one on the countershaft operated by the controller handle and the other by a foot lever directly connected to the rear wheels, aluminum body, leather upholstery, ampere hour meter, electric lights, electric horn, and ammeter.



*New Automatic Electric commercial car for small retailer or merchant*



# Buyer's Department of The Commercial Vehicle

## Buffalo Has Two Gearsets in Tandem

*2½-Ton Truck Adaptable to Unusual Road Conditions on Account of Low Gear Ratio*

### BUFFALO SPECIFICATIONS

Capacity, tons.....	2½
Wheelbase, in. ....	155
Tires, front.....	36 x 6
Tires, rear.....	40 x 8
Bore, in. ....	1.4
Stroke, in. ....	5½
N. A. C. C. h.p. ....	25.6
Final drive.....	Worm

\*Pneumatic

THE Buffalo Truck and Tractor Corp., Clarence, N. Y., has incorporated a number of unusual features in the design of its 2½-ton truck that are stated to adapt the vehicle to unusual road conditions. A double gearset that gives a gear ratio of 130 to 1 and a low speed of 1 mile in 7 3/10 hrs. in a hard pull is of unusual interest. With this arrangement, instead of speeding up the engine, the designers of this truck have reduced the speed and have applied the utmost power, causing the driving wheels to turn very slowly, giving traction and avoiding spinning.

The two selective three-speed gearsets are in tandem. The forward gearset is bolted to the engine crankcase, forming a unit power plant. The rear gearset is mounted amidships. This double gearset arrangement gives ten forward and four reverse speeds. Between the front and rear gearset there is a simple power gearset running a counter line shaft to the rear and extending beyond the frame to allow a split pulley to be mounted for any kind of stationary powerplant work. This shaft is geared down 2½ to 1 of

the engine speed and has two Hyatt bearings mounted to the rear and center of the shaft. This shaft has three speeds forward and one reverse. Drive includes two flexible universal couplings for assuring proper alignment of the gearsets. From the rear gearset to the rear axle are two Spicer universal joints with a large tubular shaft.

This truck, it is stated, may be driven up or down the steepest hills with perfect safety without using either brake, because of its low gear ratio. There are two gearshift levers located in the center and within easy reach of the seat. The operator places the second or heavy duty gearset in high, or direct drive, and drives on the first gearset as an ordinary truck having the usual three-speed gearset. Should a greater pulling power or a slower speed be required, the operator simply uses the second lever to obtain the speed required to pull out without spinning the wheels.

In order to permit very slow running where extra power is required or when the truck is standing still and operating the line shaft for stationary power purposes, an extra three-ball radiating system has been added. As shown in the accompanying illustration, this patented system is placed in front of the radiator.

Equipment includes Dyneto electric starting and lighting with Willard battery, demountable rims, pneumatic or solid tires, Alemite chassis lubrication, whistle, jack, complete set of tools, and driver's seat.

The weight of the chassis is 5680 lbs. Body allowance is 1350 lbs. The

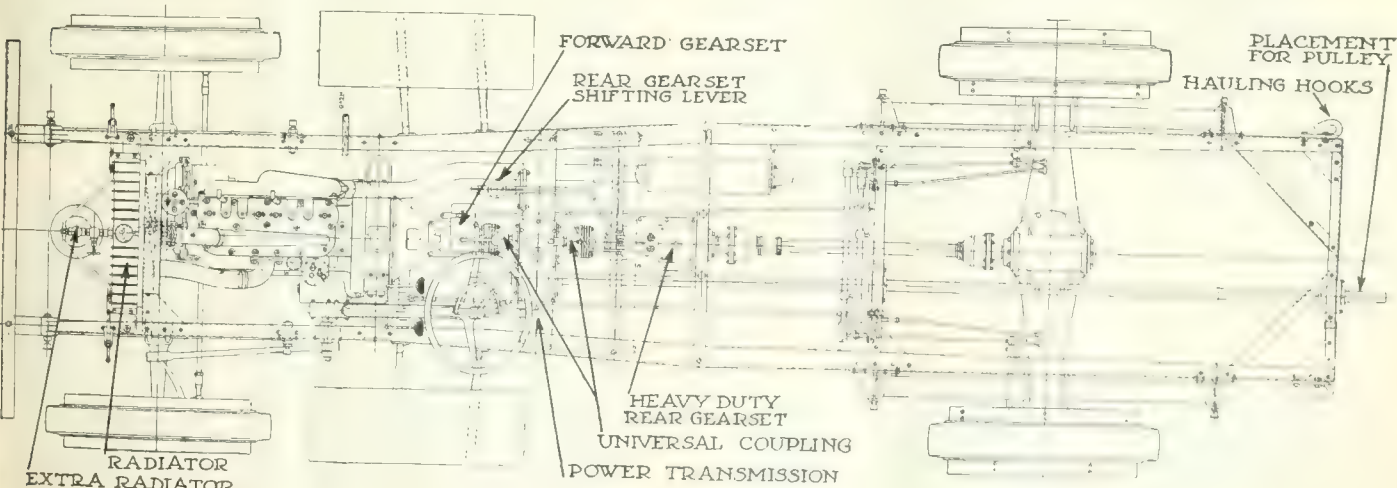
tread at the front is 58 in. and at the rear, 62 in.

The truck is assembled with a Hercules four-cylinder engine, Zenith carbureter, Simplex governor, Bosch D-U-4 magneto, Sheldon worm-driven axle and Sheldon front axle, and Ross steering gear.

The engine has a five-bearing crankshaft and the camshaft runs in three bronze bearings. The inlet and exhaust valves are interchangeable. To allow for replacement of wear, removable valve stem guides are provided. The cylinder heads are removable while the crankcase proper is divided into two sections, an upper and lower case with an additional oil reservoir case. The oil reservoir is of pressed steel and can easily be removed to allow for the adjustment of the main and connecting rod bearings without disturbing any parts of the engine. The diameter of the wristpin is 1½ in., and that of the camshaft, 1¼ in. The number of rings per cylinder is four. The width of the piston rings is 3/16 in.

Lubrication of the engine is taken care of by a high pressure, force feed system. A gear pump is located in the gear case and is used for circulating the oil. The oil enters the pump through a strainer and is forced to the main lead which supplies all the main bearings through large ducts that are an integral part of the upper case. Through a tube secured to the connecting rod, the piston pin bearing is supplied with oil from the crankpin bearing. The wristpin is lubricated through direct connection with the main pressure line.

Hotchkiss drive is employed. The semi-elliptic springs both front and rear are cup beaded, taking the shear off the center bolt. The rear springs are 3 in. wide, having fourteen leaves 54 in. long. The front springs are 2½ in. wide, having nine leaves 42 in. long.



Layout of the Buffalo chassis, showing location of extra radiator, gearsets and pulley



## Buyer's Department of The Commercial Vehicle

### Shurfit Piston Ring

**T**HIS ring is of the concentric type. It is made from an individual casting with the heat resisting scale left on the inside, which is merely ground lightly to eliminate any irregular spots. In its manufacture, immediate fit is assured by the use of the patented, flexible, individual closing devices, which close each ring separately with equal pressure around the outside, after which they are placed on an arbor and clamped in closed position. The maker is the Standard Piston Ring Co., Boston.

### Rose Battery Charging Clip

**T**HIS is designed for the express purpose of hooking up storage batteries for charging. The Rose everlasting battery clip is made by the Frank Rose Mfg. Co., Hastings, Neb. Though called a clip, the device is really a complete connector consisting of two clips, one at each end of a molded-in connecting cable. The clips proper are so made that they will make a firm, low resistance contact with the straight posts, or the flat cell connectors or the tapered inside holes of terminals. They are applied by opening with a light finger pressure.

### Spad Timer for Fords

**T**HIS timer is made up of two principal parts, the shell proper and the rotor, as herewith illustrated. The shell, which is molded of fine hard rubber insulating compound, has four brushes, with pressure furnished by a light coil spring. This spring is held in place by a brass screw and washer, which passes through the shell and forms one of the binding posts of the timer. The rotor also is formed of high-grade insulating material, into which is molded the metal surface which makes the contact. The carbon brushes are self-lubricating. The list price is \$4. The maker is the Omar Tire & Rubber Co., New York City.

The shell proper, which is the most expensive part of the timer, since it is not subject to wear but acts simply as a holder for the brushes, is guaranteed for the life of the Ford. The wearing portions are guaranteed for a year and at the end of that time can be replaced and entire timer guaranteed for another year at a cost of \$1.80.

### Goodyear All-Weather Tread Solid Tires

**T**HE non-skid tread used on this tire is similar to that used on pneumatic tires. The side walls of the new tires are built at an angle to prevent undercutting of the tread. The additional height afforded by the new tread provides an oversize factor for cushioning

## Truck Accessories

the truck. The following sizes are manufactured: 40 by 6, 40 by 7, 36 by 8, 36 by 10 and 40 by 12 in. The maker is the Goodyear Tire & Rubber Co., Akron.

### Ev-R-Greezd Universal Joint

**P**OSITIVE and efficient means of lubrication, large bearing surface and simplicity of construction are the salient features of this universal joint. The forks operate at right angles to each other, and are secured by fork caps with bolts so that each fork and cap forms a ring encircling the phosphor bronze ball or central member, which has a hollow center and acts as the lubricant receptacle. Two filling apertures allow this bronze ball to be replenished with lubricant easily, while eight outlet apertures distribute the lubricant through cartridges to compressed felt embedded in the flanges and then to all bearing surfaces of the ball, flanges and fork rings by capillary action and centrifugal force. Leather packing placed inside of the flange fits snugly between the ball flanges and beveled surfaces of the form rings. The maker is the Noys-Richardson Engineering Co., Boston, Mass.

### Bosch Magneto Drive for Fords

**T**HIS is made up of a standard Bosch magneto with a fitting for mounting it on the engine. The magneto is driven by a rotating shaft which extends from gears mounted on the camshaft to the magneto. The fitting is simple, rugged and compact. The magneto is supported on a bracket which is bolted to the cylinder block. A transverse shaft drives the magneto from the camshaft.

It can be easily installed without removing any vital part of the engine. When it is fitted the old distributor, coil and wires are done away with. If the car has starting and lighting equipment, the battery is used for that work alone. The maker is the American Bosch Magneto Corp., Springfield, Mass.

### Herz Hammerblow Timer

**I**T is stated that the Ford engine idles much slower and picks up quickly with this instrument. A hardened tool steel rod held in its place by a spiral spring is pressed against another hardened tool steel stud when the cam actuating the instrument rotates. This gives an intimate electrical contact which is abruptly broken with the passage of the cam.

The breaking of the current is sudden, which accounts for the saving of gaso-

line claimed in connection with this instrument. Elimination of inaccurate ignition caused by the lagging of the vibrator coil on the Ford, it is stated, is accomplished by the sudden interruption of the current in the Hammerblow timer which tears off these would-be sticking vibrators which are thrown into action with every rupture of the current. This gives a regular click of the engine at low speed.

The maker is the Pro-Mo-Tor Fabricating Corp., New York City. The price is \$4.75.

### Boyce Light and Parking Lamp

**T**HE Moto-Meter Co., Long Island City, has placed on the market the Boyce Moto-Meter light and parking lamp. It is so constructed that a strong beam of light is directed on the face of the Moto-Meter which clearly illuminates the instrument while no reflections are possible that would tend to confuse the driver.

This light may also be converted into a parking lamp. By turning the rear disk about  $\frac{1}{2}$  in., six rear red windows are opened up which give a red danger signal that can be seen some distance. An ingenious shutter at the rear renders the red parking lamp invisible while driving.

The price complete is \$6. A mirror may be supplied at an extra cost of \$1.

### Firestone Cushion Truck Tire

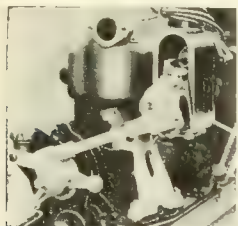
**A** NEW type of truck tire has been placed on the market by the Firestone Tire & Rubber Co., known as the Firestone Giant Cushion tire. The new design is a development of the small cushion tire and the giant single groove solid. It will be made in sizes suitable for all trucks from  $\frac{3}{4}$  to  $7\frac{1}{2}$  tons. One advantage over plain solids claimed is that the tire will stay livelier until it is worn out. This tends to lessen the power required to move the truck, and it also reduces the tendency of the edges of the tire to break off due to abuse by operators. The tire is designed in accordance with S. A. E. standards.

### Arrow Circulating Pump

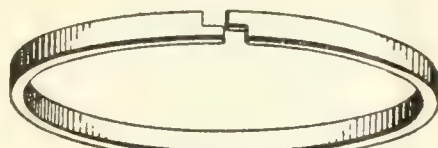
**T**HE weakest part of the ordinary circulating pump is undoubtedly the shaft packing, which often becomes leaky and requires repacking. This is largely due to inefficient lubrication. A new design of pump intended to overcome these troubles has been brought out by the Arrow Pump Co., Detroit. This pump employs oil lubrication by the so-called ring oiler method and has the packing at the inner end of the bearing instead of at the outer end.



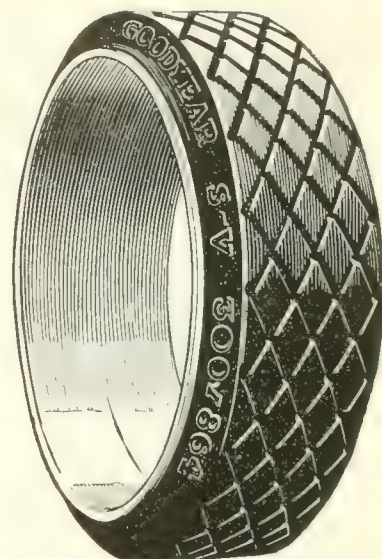
# Buyer's Department of The Commercial Vehicle



*Bosch Magneto Drive*



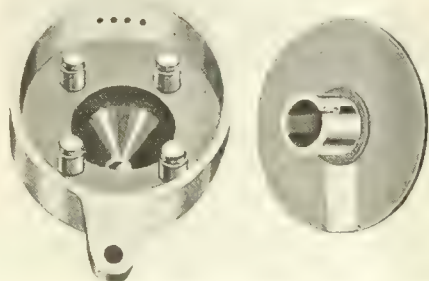
*Shurfit Piston Ring*



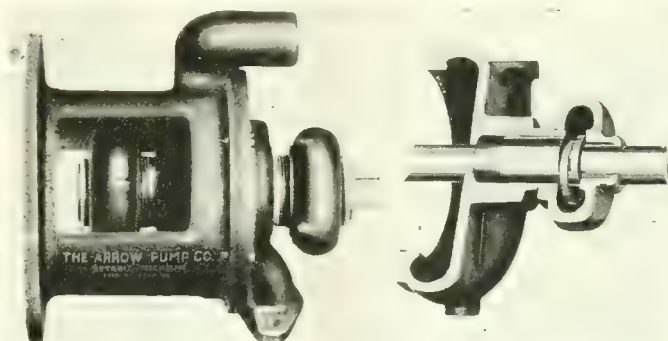
*Goodyear Solid Tire*



*Rose Battery Charging Clip*



*Spad Timer for Fords*



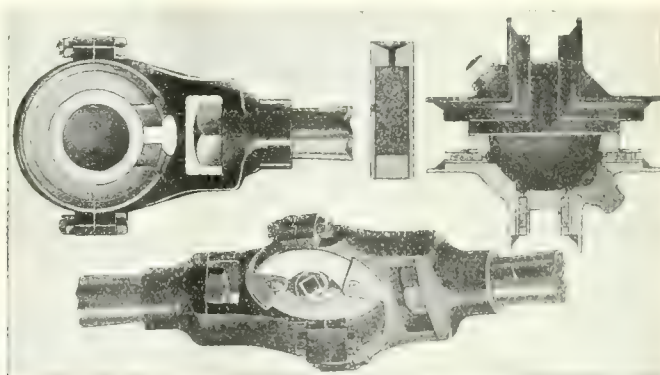
*The Arrow Circulating Pump*



*Herz Timer*



*Firestone Giant Cushion Tire*



*Ev-R-Greezd Universal Joint*



*Boyce Parking Lamp*

## Buyer's Department of The Commercial Vehicle

### Veco Ford Engine Stand

IN this machine an adjustable engine work bench, bearing fitting machine and a connecting rod aligning jig are all combined in a substantially constructed unit. Tool and part trays are provided in the most convenient places. The stand is provided with two casters, so that it may be easily moved about the shop. The stand is shipped knocked down and boxed. The price is \$39.50 and the maker is the Van Trump-Eselbey Co., Philadelphia.

### Master Reboring Tool

A SPECIAL feature of this boring device is a cutter head containing six cutters which are readily adjustable in diameter and operated by means of a plate with a spiral raceway or thread which engages grooves cut into one side of the cutters. This adjustable plate also acts as a clamping plate connected to the end of a bar extending through the spindle and which carries on the other end an index plate and lock nut. The index plate is graduated to read to 1/1000 of an inch. The spindle is keyed to a sleeve contained within the housing, from which it derives its motion. The sleeve is rotated by a worm gear which is mounted on a shaft which also carries the balance wheel. The maker is the Master Devices Co.

### Jackson Tire Tool

THE tool itself is made of steel and grey iron. The spring operated jaws are hooked around the rim about 6 or 8 in. from the split and two solid legs are then hooked on the rim so as to divide the circle into approximately three equal segments. The tool is adjusted to different size rims by means of a turnbuckle. This turnbuckle is also used to collapse the rim. The price is \$5. The maker is the National Safety Car & Equipment Co., St. Louis, Mo.

### Veco Rear Axle Stand

THIS stand is designed to facilitate the repair work on all vehicles having a divided rear axle housing. The rear axle housing is held by one end only, so that the other half may be drawn out and the axles or differential assemblies drawn out in the least possible time. The vise jaws are closer together at the top than at the bottom, so that it is unnecessary to screw the hand wheel tight in order to hold a rear construction in the horizontal position. The price is \$31.50. The maker is the Van Trump-Eselbey Co., 1918 Cherry Street, Philadelphia.

### Cylinder Reboring Mill

THIS machine will rebores any open head cylinder block the extreme height of which does not exceed 20 in.,

## Shop Equipment for Fleet Owners

and cylinder diameter of from 2 13/16 to 5 in. The cutter head contains three adjustable cutter blades, which are set by a micrometer gage. The machine is equipped with a self-centering device and an automatic stop. The power consumption is 1 hp. The floor space is 50 by 40 in. and the weight 1500 lbs. The maker is the Hinckley-Meyers Co., Chicago.

### Rysco Bench Clamp

THIS has been designed for holding the Ford cylinder block while working on the gear and camshaft bearings, etc. The weight is 65 lbs. The price is \$20 and the maker the Railway Specialty Co., Atchison, Kan.

### Meyer Valve Port Cap Wrench

A SPECIAL wrench for removing valve port caps has been placed on the market by the Carl Meyers Co., Toledo. It is equipped with two sets of blades and four hexagon plugs to fit the port caps of different engines. It is designed to eliminate damage and breakage of the caps.

### Whitney Valve Refacing Lathe

THIS lathe is designed to be mounted on the bench or held in a vise. It is adjustable to take any valve from 1/4 in. to 1/2 in. stem diameter and valve head diameters up to 2 3/4 in. The feed control is mounted on a sliding block traveling on a guide which insures accurate centers and even tension of the valve against the cutter. The cutter is held in place by means of two screws. A crank is attached to the end of the valve stem. The price is \$8.50. The maker is the R. S. Whitney Mfg. Co., Lewiston, Me.

### Dilutometer Shows Condition of Crankcase Oil

THIS instrument when immersed in a sample of oil indicates to what degree the oil has been contaminated by the heavy portions of the fuel which have passed the pistons and rings.

The device is made like the hydrometer tester for measuring the gravity of storage battery solution, and is used in the same way with the exception that surrounding the stem of the float is a sleeve which may be moved up and down. The sleeve is made of celluloid and is lithographed with the words "Danger," in red letters, "Poor," "Fair," "Good," and "New Oil Line."

With the instrument a chart is supplied which shows to which graduation on the float stem the sleeve is to be set when measuring the various brands and grades of oil. The reason for this is a variation in the gravity of the various brands and grades which must be taken into consideration when the investigation is made.

It is said that the Dilutometer frequently shows that an engine is operating on a lubricant which consists of from 35 to 47 per cent kerosene or other of the heavy unburnable end products of the fuel.

The maker is the Larclyff Products Co., 1464 East 57th Street, Chicago.

### HB Air Service Pump

THE Hobart Brothers Co., Troy, N. Y., maker of small battery charging apparatus, has placed on the market the HB automatic air outfit, designed for the use of garages. The outstanding features of the apparatus are that all gears, pulleys and belts have been eliminated, the pump being built into the unit and directly connected to the shaft of the low speed ball bearing motor.

As the pump operates in an oil bath, it is claimed that the device is practically noiseless and so light running that very little current is consumed. The automatic control is set to a cut in pressure of 150 lbs. and a cutout pressure of 200 lbs. In conformity with its established policy the Hobart Brothers Co. is marketing the apparatus on the monthly payment plan.

### Johnson Bench Furnace

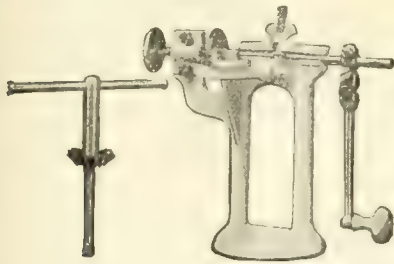
THIS is designed to operate direct from the gas mains without the interposition of a blower. The device is adaptable to many uses besides that of the heating of soldering coppers. In the top of the combustion chamber, which is lined with a highly refractory insulating composition, is a hole into which a 20-lb. melting pot, 6 in. in diameter, may be inserted for the melting of lead, babbitts or other bearing metals.

Two swinging doors, one on each side of the combustion chamber, permit of placing long rods in the device in such a way that any part in their entire length can be heated. A lid at the front of the combustion chamber is so designed that it almost completely covers the opening, leaving a slot at the top wide enough to permit of soldering coppers being inserted. When heating the latter way, they are supported in the rear of the combustion chamber, there being a ledge which holds them clear of the bottom of the device and the tinned portions out of the direct flame blast.

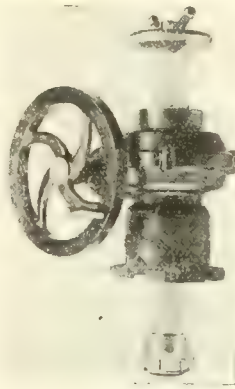
The maker is the Johnson Gas Appliance Co., Cedar Rapids, Iowa.



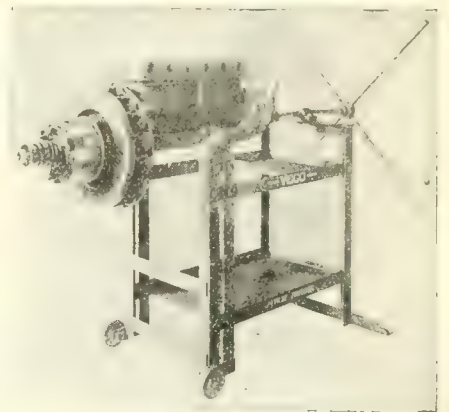
# Buyer's Department of The Commercial Vehicle



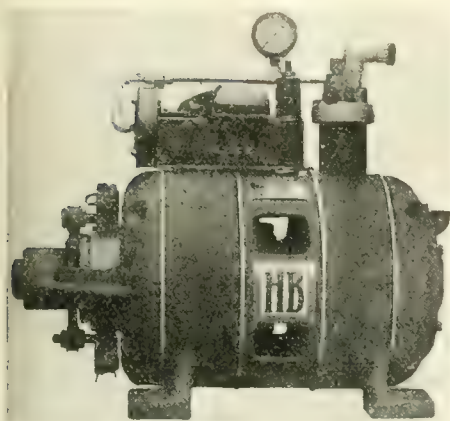
*Whitney Valve Refacing Lathe*



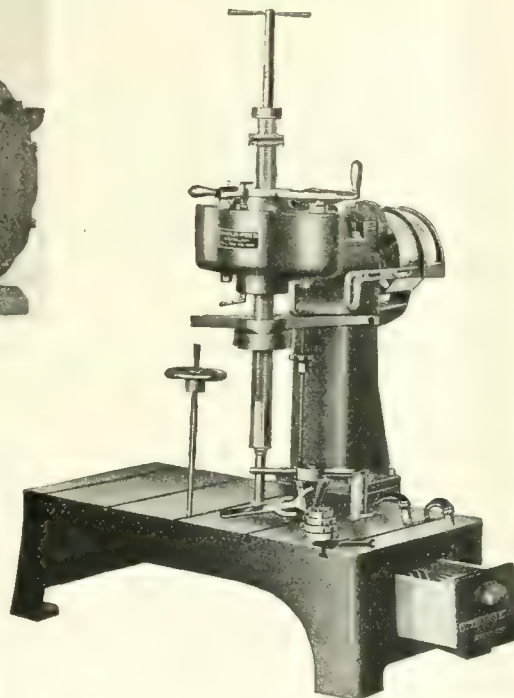
*Master Reboring Tool*



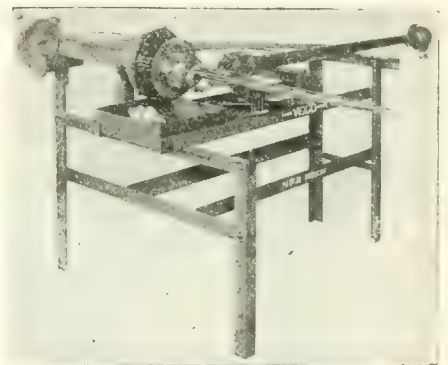
*Veco Ford Engine Stand*



*HB Air Service Pump*



*Cylinder Reboring Mill*



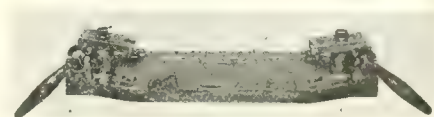
*Veco Rear Axle Stand*



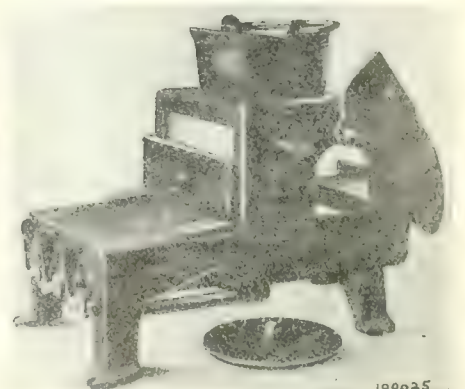
*Meyer Valve Port Cap Wrench*



*Jackson Tire Tool*



*Rysco Bench Clamp*

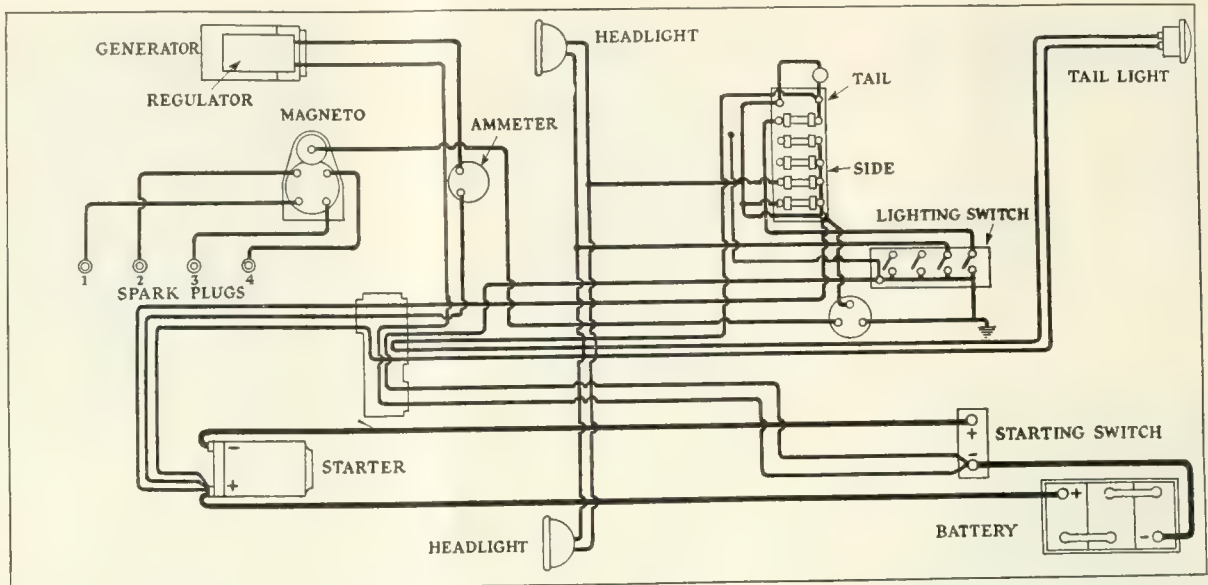


*Johnson Bench Furnace*

*Dilatometer*

# Motor Truck Electric System Wiring Diagrams

## 34—Starting and Lighting Unit on Packard Trucks



Wiring diagram of the starting and lighting system used on the models E and D Packard trucks. The tail light may be used on an independent system when necessary

### These Diagrams Are Valuable —Save Them

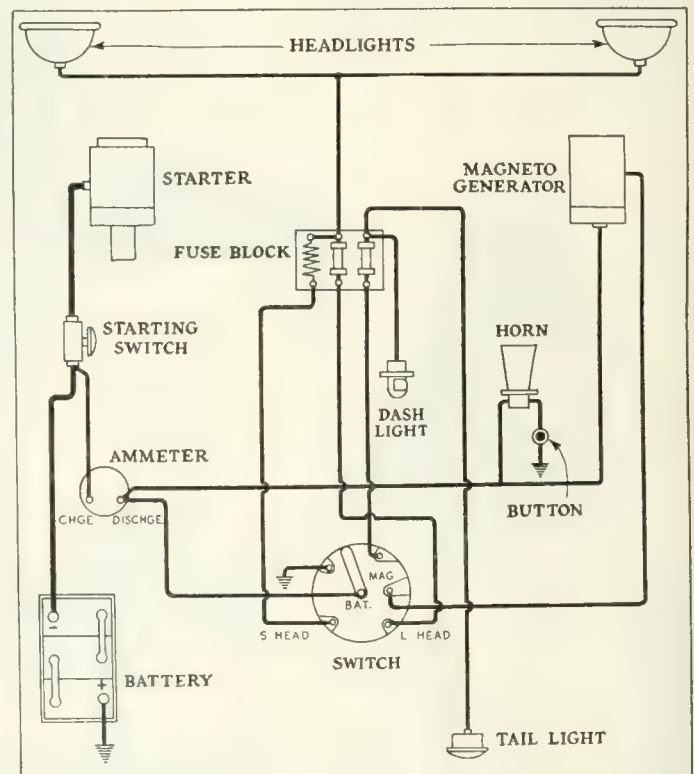
When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE.

1920	
1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting .....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15

1921	
12—Maxwell, Lighting.....	Jan. 15
13—International, Starting and Lighting.....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 15
17—Reo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Apr. 15
19—Stewart, Starting and Lighting.....	May 1
20—Kelly-Springfield, Starting and Lighting.....	May 15
21—Riker, Starting and Lighting.....	May 15
22—U. S., Starting and Lighting.....	June 1
23—Wilcox, Lighting.....	June 1
24—Pierce-Arrow, Starting and Lighting.....	June 15
25—Republic, Starting and Lighting.....	June 15
26—Parker, Starting and Lighting.....	July 1
27—Noble, Starting and Lighting.....	July 1
28—Onelda, Starting and Lighting.....	July 15
29—Oshkosh, Starting and Lighting.....	July 15
30—Knox, Starting and Lighting.....	Aug. 1
31—Master, Lighting.....	Aug. 1
32—Watson, Starting and Lighting.....	Aug. 15
33—Service, Lighting.....	Aug. 15
34—Packard, Starting and Lighting.....	Sept. 1
35—Tiffin, Starting and Lighting.....	Sept. 1

## 35—Starting and Lighting Unit on Tiffin Truck



Wiring system used on Tiffin truck when a six-volt magneto generator is used. A generator of the single unit system may be also used





## Subject of Idle Time Puzzles Reader

To the Editor, COMMERCIAL VEHICLE:

I have your cost system for motor trucks, but there are a few questions that are still doubtful in my mind. Would you please answer them and give your reason for your decision? What is idle time? Is the following idle time: Lunch hour, periods of unloading, truck in garage for repairs, truck in garage before full day of 9 hr. is put in, waiting for loads, waiting at ferries or terminals, waiting to unload?—READER.

There is a difference of opinion as to what is included in idle time, and there seems to be some doubt as to what part idle time plays in estimating truck costs. The industrial plant definition of idle time is something like this: It is the time during which there is no work for a piece of machinery to do—or during which that piece of machinery is unfit to work. Translating this in terms of a truck: Idle time would include only working hours or days when the truck is in the garage owing to a lack of work for it, or working hours or days during which the truck is unable to work—e. g., is undergoing repairs.

There is another item, in addition to idle time, which should be carefully considered. This is called unproductive time. There may be enough work for a truck to keep it busy every working day in the year. It may be so carefully driven—and so well looked after, after working hours—that it spends no working time in the garage at all, for repairs or for any other purpose. But that truck may still be working far below its maximum efficiency and may be actually losing money for its owner. This loss of efficiency may be due to an excess of unproductive time.

There are two types of unproductive time which must be considered—which must be carefully watched and checked—if the truck is to attain its highest earning power. The first is loafing time, in which the driver stops to talk to a friend, in which the loaders stop to discuss some current topic or time when a truck is forced to go on a detour in order to give a lift to a friend of the driver.

The second might be called avoidable delays in operation and would include inefficient loading methods, the wrong type of body for the best loading and unloading, avoidable waits at terminals or freight yards, poor routing as regards avoiding congested districts, avoiding ferries where possible, avoiding poor

**D**EVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

roads where possible and, finally, an avoidable unloaded run to or from the loading platform.

But if avoidable delays—for there may be avoidable delays under all three of these heads—there will be items of lost or wasted time which will be difficult to classify. For example, if a driver forgets to take a spare tire with him, gets a puncture and is laid up on the road for a while, is this idle time under the first head, or loafing time under the second?

Now what part does idle time play in estimating truck costs? Any one and

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

all three kinds of idle or unproductive time affect truck costs. All three types are present in truck costs. But none need be considered in estimating what the truck costs actually are.

The actual costs are made up of definite charges against the truck and nothing else. You cannot make a concrete charge in dollars and cents for idle or unproductive time in estimating what the truck costs to operate, because idle and unproductive time are present in and a part of almost all the other cost items.

But idle time and unproductive time are and should be considered always in reducing these costs when they have been estimated.

So far as estimating costs is concerned, idle time and unproductive time are side issues. But they are issues the importance of which cannot be exaggerated.

## Average Speed of Truck Engines and Different Units

To the Editor, COMMERCIAL VEHICLE:

We will appreciate any information you can furnish us with regard to the average speed of truck engines and the speed of the different units through which it is reduced to the pull on the rear wheels.

We are subscribers to your publication, and if you are in a position to furnish the above information we can assure you that it will be greatly appreciated.—DAVID MCROBERTS, Auto Truck Equipment Co., Pittsburgh, Pa.

With regard to the average speed of truck motors, we take it that you are referring to the revolutions per minute of the engines for different capacity trucks. We have, therefore, struck an average for the 1-, 2-, 3½- and 5-ton trucks. These averages work out as follows:

1-ton .....	1772 r.p.m.
2-ton .....	1493 r.p.m.
3½-ton .....	1293 r.p.m.
5-ton .....	1097 r.p.m.

To obtain these averages we have taken the revolutions per minute for ten trucks, taken at random, and averaged them for each capacity.

With regard to the speed of the different units through which speed is reduced to the pull on the rear wheels, we should judge that it is the speed of the driveshaft or propeller shaft which you require more especially. On direct drive, of course, the driveshaft has the same speed as the crankshaft. The secondary gearshaft runs at about one-half the speed of the crankshaft.

Where four speeds are used on trucks mounted on solids, the low-gear transmission reduction ratio varies between 1 to 4 and 1 to 5.

In case you may want them, however, we add here the average total gear reductions on high gear of trucks of different capacities:

½-ton.....	4.1 to 1
1-ton.....	6.8 to 1
1½-ton.....	7.7 to 1
2-ton.....	8.4 to 1
3-ton.....	9.4 to 1
4-ton.....	10.2 to 1
5-ton.....	11.2 to 1

As regards the revolutions per minute of the engines of all different makes, you will find more complete information on this subject in the truck specification issue of THE COMMERCIAL VEHICLE published Jan. 1, 1921, under engine speeds in the specification tables.



## Maintenance Cost and Driver's Salary Will Vary

To the Editor, COMMERCIAL VEHICLE:

Will you kindly tell me the actual maintenance cost, including driver's salary, for a  $\frac{3}{4}$ -ton to the largest made truck? Average run 50 miles per day. Same for electric trucks.—THOMAS ARMSTRONG, sales department of Yellow Cab Co., 25 W. Grand Ave., Chicago, Ill.

We feel sure you will understand that it is difficult to give you this information without knowing the class of work in which the trucks are presumably engaged. Both maintenance costs and drivers' salaries vary considerably with the type of work handled. Without this data, therefore, we can only quote you costs which we have on hand for the different capacity trucks averaging the 50-mile run.

For example:

1—Sam Abdo of Toledo, Ohio, operates a  $\frac{3}{4}$ -ton G. M. C. collecting fruit from the freight yards and hauling same to and from a wholesale house. The truck averaged 50.8 miles per day, the driver cost \$5 per day, the maintenance and repair actually cost nothing, although, of course, the operator has not figured in any overhead, and the estimated maintenance and repair was \$.0164 per mile, or about 82 cents a day.

2—Oliver Hardman of St. Louis operates a 1-ton truck in the retail delivery of fruit and produce. This work averaged 51.43 miles per day, the driver cost \$5.57 per day and the maintenance and repair cost \$.025 per mile, or about \$1.29 per day.

3—The H. Kind Baking Co. of Elgin, Ill., operates a  $1\frac{1}{2}$ -ton G. M. C. truck in the local delivery of bread to the consumer. This truck averaged 46 miles per day, the driver cost \$4.50 per day, the maintenance and repair cost \$.0125 per mile, or about 58 cents per day.

4—THE COMMERCIAL TRUCKING WORLD estimated the average cost of operating a 2-ton truck running 50 miles per day as follows: The driver costs \$6 per day and maintenance and repair cost 2 cents per mile, or \$1 a day. These are average costs estimated from actual figures on a large number of 2-ton trucks in various types of haulage work.

5—R. J. Dunleavy of Syracuse, N. Y., operates a  $3\frac{1}{2}$ -ton truck in the collection of milk cans. Records kept on 140 days' work showed that the driver cost \$4.75 per day, working half a day, and the repair costs per mile were \$.016, and, as the truck operated 56 miles daily, the repair costs per day were about 90 cents.

6—The Heavy Haulage Co. of New York City operates a 5-ton Pierce-Arrow, which averages 50 miles per day. The company estimates that the driver of this truck costs \$5 per day and that the maintenance, repairs, overhauling, painting on body and supplies, such as tire chains, lamps, etc., cost \$3.30 per day. The supplies, tire chains, lamps, etc., are estimated at \$1 per day. Overhauling is estimated at 5 cents per mile, \$2 per day, or \$600 per year. Repairs and painting on the body are estimated at 30 cents per day.

We regret that we have no record of trucks of greater capacity than 5-ton which operate 50 miles per day. There may be examples of these very heavy trucks making such long runs, but they are certainly infrequent.

We regret to say, also, that we have no data on any electric trucks making daily runs of this length. The field of electric trucks lies in very short haul work with many stops, and it is doubtful whether electric of any capacity attain 50 miles a day, except possibly in very rare instances.

## Motor vs. Horse Delivery Costs in Light Work

To the Editor, COMMERCIAL VEHICLE:

If you have compiled any data showing the comparative cost of making light deliveries by motor and horse-drawn conveyances we will greatly appreciate your sending same to the above address for the attention of the writer.—GEORGE E. SHERMAN, sales department, Ford Motor Co., Chicago, Ill.

We have published a number of articles comparing the cost of deliveries when using trucks and when using horses. If you will refer to an article in the Readers' Forum at the bottom of page 38 in the March 1, 1918, issue of THE COMMERCIAL VEHICLE, you will find a résumé of earlier articles dealing with this subject. Also on June 1, 1917,

## Pro-rating Insurance, Etc.

INSURANCE, supplies, mechanic's time, driver's time, must all be charged against each truck in order to get accuracy in truck cost accounting.

Read the letter on this page covering this subject.

page 8, there is a full comparison of the costs of trucks, tractors and horses in street cleaning work.

In the Sept. 15, 1920, issue, page 114, there is an article showing that a truck did the work of twelve horses and reduced delivery costs about \$10,000 yearly. The truck cost \$14.54 per day to operate, while the twelve horses cost \$48 a day and did less work.

In the Nov. 15, 1920, issue, page 252, you will find an article describing how a 12-ton tractor and semi-trailer saved \$10,000 a year by replacing three teams in the horses' own field of short haul work.

Again, in the March 15 issue, page 112, there was an article describing how, with only 58 full days of work each year, a truck still proved cheaper than four mules per ton-mile. The cost of operating the mules is given in full, as well as those of operating the truck.

Lastly, in the April 1, 1921, issue, page 144, you will find an article describing how a 1-ton truck replaced four horse wagons and saved \$5,500 per year in wholesale delivery work involving many stops.

## Pro-rating Insurance, Supplies, Mechanic's Time, etc.

To the Editor, COMMERCIAL VEHICLE:

In the case of a fleet of trucks will you please explain the following: How would you pro-rate insurance which is issued for the fleet; supplies purchased for the fleet, not directly for each truck; driver's time, and mechanic's time?—READER.

The manner in which insurance is charged against the trucks will depend upon the type of insurance carried. If a blanket insurance policy is carried, the cost on all the trucks is carried, the cost of the premium for the year should be divided by twelve for the month and then charged off equally against the different trucks. If separate policies are carried, the premiums will, of course, be charged to the individual vehicles involved. In the case of a blanket policy, where you have trucks of different capacities, the following plan would be the best: Find the total value of the fleet and the percentage value of each truck in it on the basis of original cost, then take the corresponding percentage of the blanket insurance and charge it to each truck. Suppose you have three trucks, one of which cost \$5,000, the second \$3,000 and the third \$2,000. The total fleet cost \$10,000. Of this, however, the first truck cost 50 per cent, the second 30 per cent and the third 20 per cent. If you have a blanket insurance of \$100 a year premium on the fleet you would then charge \$50 of it to the \$5,000 truck, \$30 to the \$3,000 truck and \$20 to the \$2,000 truck. This is the way to charge blanket insurance. Charge one-twelfth of each amount per month.

In regard to your second question, the most usual way to charge this stock is to pay for it out of a sinking fund and charge it to stock on hand. Each part as it is used should then be charged to the truck on which it is used. But the new stock should not be charged to the fleet or to any truck at all until it is actually used.

Charging off driver's time depends upon whether the driver is paid according to the number of hours he works or so much per week. In the former case the hours he works and is paid for should be charged against the truck on which he works. In the latter case the total monthly or yearly salary should be divided by the number of days on which the truck is operated and charged to the truck accordingly. There is one point here, however, which should not be forgotten in estimating drivers' wages. If the driver works his entire working time on a particular truck, his entire salary should be charged to that truck. But if part of his working time is taken up in warehouse work, or other work not connected with the truck, an equivalent percentage of his salary should be charged away from the truck to the department involved.

If mechanics are maintained for repair work on the trucks the charge against the truck may be made on a time basis. That is, if a mechanic works on a truck 16 hr. during the month and



receives 50 cents an hour, the truck will be charged with \$8 mechanic's time. On the other hand, the wages paid mechanics may be lumped together and divided equally between the trucks in the fleet. The first system is preferable, as it permits of a closer check on the efficiency of the individual truck. But in any case, if the mechanics are maintained solely for the trucks, the entire cost of those mechanics must be charged off against the trucks. Conversely, if the mechanics have other work besides the truck repair, only a proper proportion of their wages should be charged against the trucks.

Wants Explanation of Scleroscope

To the Editor, COMMERCIAL VEHICLE:  
Will you kindly explain the Scleroscope and where same can be purchased?  
—R. C. REUTHER, Jamaica, N. Y.

The Scleroscope is an instrument invented by A. F. Shore for determining the hardness of metals. It consists chiefly of a vertical glass tube in which slides freely a small cylinder of very hard steel, pointed on the lower end, called the hammer. This hammer is allowed to fall about 10 in. on to the sample to be tested, and the distance it rebounds is taken as the measure of the hardness of the sample. A scale on the tube is divided into 140 equal parts, and the hardness is expressed as the number on the scale to which the hammer rebounds. Measured in this way the hardness of different substances is as follows:

Glass .....	130
Porcelain .....	120
Hardest steel .....	110
Babbitt metal .....	4-10
Copper .....	6

It will be possible for you to buy a Scleroscope from the Shore Instrument & Mfg. Co., Jamaica, N. Y.

Trucks Equipped with Glass Lined Thermos Tanks

To the Editor, COMMERCIAL VEHICLE:  
The use of glass lined thermos tanks in hauling milk from Soledad to San Francisco has demonstrated that this is far superior to the old method of hauling the milk in 10-gal. tanks.

Recently the United Milk Co. had 1500-gal. glass lined thermos tanks installed on two Pierce-Arrow trucks and on three Reliance trailers. The tanks were insulated with a layer of felt packing three inches thick. After the felt was wrapped with wire it was covered with a waterproof roofing material. A galvanized iron jacket was then placed over this. The tanks are mounted on heavy bolsters, and by means of "U" bolts the bolsters are firmly attached to the chassis in a manner similar to that used on oil tanks.

The milk is delivered to the 1500-gal. tanks from the cooling plant at Soledad at a temperature of from 34 to 36 deg., and, because of the perfect insulation,

the milk is delivered at San Francisco at not more than 2 deg. higher. This is a very great advantage over the old method of shipping the milk in 10-gal. tanks, as the bacteria is kept down, there being no growth whatever.

There are many other advantages gained in using the thermos tanks. One advantage worth mentioning is the great saving in fuel.

Because of the fact that the new equipment is 5 tons lighter than the equipment necessary when the milk was hauled in 10-gal. tanks, there is a saving of 15 gal. of fuel on each round trip. A round trip (268 miles) is made by each truck and trailer every 48 hr., the trucks never varying from the regular schedule more than 10 min. The loaded truck and trailer leaves Soledad at 12 p. m. and arrives at San Francisco at 12 noon, making the 134 miles in exactly 12 hr.

Preparing for Winter

Now is the time to start preparing for cold weather driving. The comfort of the driver, prevention of frozen radiators and engines, non-skid devices, etc., should be considered in this preparation.

Read the lead story in this issue. It will give you some valuable information in regard to winter driving.

Wants Wiring Diagrams for Trucks and Cars

To the Editor, COMMERCIAL VEHICLE:  
I am in search of wiring diagrams for passenger cars, as well as trucks, from 1916 to the present time. I am especially in need of diagrams for starters and generators. Please let me hear from you at once as to where I might obtain them if you do not have them yourself.—J. RINGO, Louisville, Ky.

It will probably be possible for you to get diagrams as far back as 1916 from the Automotive Publishing Co., 440 S. Dearborn Street, Chicago. The book published by this company is entitled "Automotive Wiring Manual," by Harry Lorin Wells. You will find truck wiring diagrams for 1920 in each issue of the COMMERCIAL VEHICLE. These will include 1921 models.

Substitute for Differential—Separate Clutches

To the Editor, COMMERCIAL VEHICLE:  
I would like to inquire if any passenger cars or motors have been built using two clutches, one in each rear wheel in place of a differential. If not, would this, in your opinion, work in case clutch is disengaged in going around sharp corners?—T. E. NEFF, New York City.

The clutch principle has been tried on numerous occasions. The first device of this sort to be placed on the market was the Hedgeland differential nut axle and jackshaft device, which consisted of nuts carried on threaded driving shafts which were forced into engagement with cone-shaped cups when power was applied to the driving shafts, thus providing a frictional engagement with the driven members.

The Wayne differential was produced by a firm in Fort Wayne, Ind., a few years ago, accomplishing the same result. It was first used in Ideal trucks and later in the first models of Jeffery four-wheel driven trucks. This device comprised a unit to be installed in place of the regular differential and consisted of two expanding friction clutches floating between clutch cups on the driven members and cams carried by the driving ring-gear. The twisting of the cams within the clutches served to expand them and engage the cups, thus providing a connection. As in the case of the earlier Hedgeland device, when going around turns the outside wheel in running faster overtook the cam in the Wayne device and the thread or worm in the Hedgeland, thus causing the clutch to be withdrawn and allowing the outer wheel to run free so long as it ran faster than the inner one. Both devices provided a positive drive to the slower wheel under all conditions and were therefore free from the faults of the usual geared type of differential.

Neither of these devices survived, however, as in coasting they both allowed their clutches to become disengaged, so that the engine could not be used as a brake. A transmission brake was also made impossible by this action. A further difficulty was that after such disengagement, which took place each time the engine was suddenly throttled down, the reapplication of power caused both clutches to take hold suddenly.



Glass lined thermos tanks used for hauling milk





## When They Wear Thin!

**D**O you have a good deal of trouble with your trucks?

Do they come in at night with damaged fenders? Are your tire costs higher than you think they ought to be, on account of repair costs and low mileage?

Probably they are. And probably you do have a good deal of trouble with damaged trucks. Also, you probably blame the drivers—quite rightly—and have a high turnover, looking for men who will not damage the trucks and tires.

But this last is usually a mistake. For drivers are only human and the best of them will get careless, *unless you keep the need for care constantly before their attention.*

Changing drivers will do you no good—but talking to the ones *you have* may do you a lot of good in reducing accidents and excessive tire costs.

Your drivers do not wilfully damage the trucks or the tires—unless they are badly disposed. In that case you ought to get rid of them as quickly as possible.

But in most cases they are not badly disposed. They are just human.

No driver wilfully damages his vehicle. No driver comes to work, as a rule, with a grouch. No driver starts out in the morning with a sort of “Now, then, let her go all out, and to h—l with the consequences.”

But——

Wait until the day is old and they have put in six or seven hours of hard work. Wait until they have had an argument or two with a sulky maid-servant, with a cop who has just been taken off his favorite beat on Main Street and put on a beat out at the city dump, with a shrill-voiced shopper or with another driver who has an over-developed sense of humor.

That is the time—when they are tired and irritable—that is the time that they slam in the clutch—or bring up against the curb with a bang that jars every running part in the truck and snaps the tire fabric like pack-thread.

They are only human and they are subject to human reactions of this sort.

But that is just the time against which they should be warned.

It is easy for a driver to drive carefully and consider the interests of his firm when he starts out in the morning feeling fine.

But it is later in the day, when he is tired and cross and the truck is knocking a little and is a little stiff to steer. That is the time when a good driver shows his mettle.

Tell your drivers so. Warn them against that time. Help them to realize that it is not the sudden spurt that counts, but the long, steady pull. It does no good for him to treat his truck with exaggerated care for the first part of the day and drive it like a fire engine or an ambulance the last part.

It is much better to be moderately careful all the time. To get the work done, but get it done steadily and reasonably. Tell them so.

In the long run, it will pay the firm better if they leave a few of the deliveries until the next day, rather than over-speed, race the engine, damage the gears and injure the tires in a despairing effort to get through an unusually heavy load in the usual time. Tell them so.

Warn them against the time when tempers wear thin. For that is the time when the damage is done.

Finally, if you feel that you cannot bring these things home to them satisfactorily by talks alone, perhaps you can establish a bonus system which will make it worth while for the drivers to watch out for those times. It may be worth *your* while in the end.

There are many types of bonus. You can probably work out a system which will be entirely adapted to the business. And the cost of it will probably be more than made up by the reduced costs of repairs, maintenance, new parts and depreciation.

But base the bonus system on the long, steady pull and warn them to watch out for the time when tempers wear thin, when nerves are a little weary and when every consideration other than getting through the work is apt to fade into the background.



## New Freight System Out of Pittsburgh

### Rainbow Lines, Inc., Brought to Pittsburgh by Board of Trade

PITTSBURGH, Aug. 18.—Within the limits of a circle having Pittsburgh as a center and a radius of 100 miles, are located a large number of very important commercial centers. The freight of these short hauls has long ago outgrown the ability of the railroads to handle.

Such a territory embraces Wheeling, in West Virginia, Waynesburg, Uniontown, Brownsville, Washington, Monongahela, Somerset, Johnstown, Greensburg, Connellsville, McKeesport, Kittanning, Butler, Freeport, Tarentum, New Castle, Rochester, New Brighton, Beaver Falls and other cities in Pennsylvania; East Liverpool, Wellsville, Steubenville and others in Ohio.

Encouraged by the Pittsburgh Board of Trade and the local banking institutions, the Rainbow Lines, Inc., was organized with a capital stock of \$450,000. A central freight terminal was located in Pittsburgh together with a body building plant and terminal plants in various cities. For instance, an excellent warehouse and terminal plant was erected in Connellsville—a two-story structure with 40,000 ft. of floor space.

All kinds of freight is now handled on a day schedule at the very low rates averaging from 50 cents to \$1 per 100 lb.

Selden trucks of 3½-ton capacity have been adopted as standard equipment. It is expected that 30 trucks will soon be in operation, being purchased in fleets of five.

So far it has been found that these trucks operating with an average load of 6000 lbs. on all trips, are costing approximately \$25 per day, including all items of fixed and variable charges and drivers' wages. All trucks have been averaging from 70 to 100 miles daily.

The Rainbow Lines, Inc., gives the advantages of daily express service, 1-day delivery between all points, no lost shipments, no damaged goods, no claims to file, all freight in transit secured, in fact all the advantages of the very speediest service with the common disadvantages of shipping eliminated.

### Protests Federal License Fee

PHILADELPHIA, Aug. 18.—Since the recent launching of the owner-membership campaign by the Motor Truck Association of Philadelphia—the biggest news event in Philadelphia motor circles this year—in conjunction with the motor truck organization of Pittsburgh, to include, if possible, every owner in the State, in addition to dealers and distributors, the association in this city has protested to members of the United States Senate and House of Representatives against the proposed \$10 Federal license fee on all motor vehicles. This

mailed protest will be followed by personal solicitation among the legislators.

The membership campaign is bringing big results from all over the State and every mail brings in applications.

### No Exclusive Franchises

SPRINGFIELD, ILL., Aug. 19.—Motor bus and truck companies, operating in Illinois, will not be given exclusive franchises over the routes they travel and must file sufficient security bond to guarantee the payment of all damages. This ruling has been made public by the Illinois Commerce Commission, following complaints from various traction, electric and steam lines that find the motor vehicles an irritating source of competition. The commission rules that all motor bus or truck owners must comply strictly with all ordinances and other regulations of the city, township, county or State in which they operate.

### Graham Resolution Passed by House

WASHINGTON, Aug. 15.—From the viewpoint of motor truck manufacturers and dealers the most important legislation acted upon in Congress since the war was the passage in the House, by a vote of 186 to 83, of the joint resolution introduced by Representative Graham, Illinois, which would impose a 90 per cent ad valorem duty on all goods sent to France and England from the United States during the war and reimported for sale in this country. Every effort will be made to get favorable action on the resolution in the Senate before recess is taken. Senate leaders have already expressed themselves favorably.

### General Motors Cut Prices

PONTIAC, MICH., Aug. 17.—General Motors Truck Co. announces price reductions effective Aug. 17, on all its models. The largest cut is on the one-ton. The prices follow:

		New Price	Old Price
Model K	16 1 ton.....	\$1495	\$1995
Model K	41 2 ton.....	3000	3250
Model K	71 3½ ton.....	4250	4500
Model K	101 5 ton.....	4650	5100

### Koehler Trucks Cut

BLOOMFIELD, N. J., Aug. 17.—Price reductions averaging about \$500 on its trucks and tractors have been announced by the H. J. Koehler Motors Corp. The prices follow:

		New Price	Old Price
Model D	1½ ton.....	\$1885	\$2285
Model M	2½ ton.....	2875	3365
Model MGS	2½ ton.....	2975	3450
Model F	3½ ton.....	3985	4450
Model MT	5 ton. road tractor .....	2975	3450

### Cut Traylor Trucks

CORNWELLS HEIGHTS, PA., Aug. 15.—Lower prices for all models of its trucks have been put into effect by the Traylor Engineering & Mfg. Co., as follows:

		New Price	Old Price
Model B	1½ ton.....	\$2500	\$2900
C—2	ton.....	3000	2850
D—3	ton.....	3500	3300
E—4	ton.....	4700	4450
F—5	ton.....	5100	4700

## Trolley Company to Operate Buses

### Expected New England Railways Will Make Purchase in Wholesale Lots

NEW LONDON, CONN., Aug. 22.—Verification by President L. S. Storrs at a hearing before the Public Utilities Commission in Waterbury, of long-standing rumors that the Connecticut company, which has a near monopoly of trolley franchises within the State, plans to meet competition through the operation of motor buses, 10-cent fares with transfer privileges, is causing considerable concern to automotive interests throughout the State, with the outcome being closely watched. Such bus service, it was stated by President Storrs, would be on streets and in territory which have no trolley service, or where service is in danger of abandonment because of non-payment of operating expenses. Should such service be inaugurated in Waterbury and vicinity, and prove a success, automotive interests believe it will be extended to State-wide adoption. That it will cripple or seriously curtail privately-owned jitney competition is the belief of automotive interests, and by so doing, hit them a serious financial blow.

If the traction interests go into operation of motor buses on a large scale, it is pointed out, it will undoubtedly mean cars will be bought directly from the manufacturers in wholesale lots.

### Townsend Highway Bill Passed

WASHINGTON, Aug. 23.—Eliminating the provision calling for the establishment of a Federal Highway Commission, the Senate to-day passed the Townsend highway bill appropriating \$75,000,000 for the construction and maintenance of roads, one-third of which will be available immediately and the balance to be distributed within 6 months. It was for the recognition of this highway commission plan that the automotive industry conducted a strong legislative campaign. The defeat was brought about by an unexpected eleventh-hour change of front on the part of Senate leaders. It is believed that the opposition developed not because of the industry's advocacy of it, but owing to the growing evidence of a reaction against bureaucracy or investment of power in new commissions.

Senators from the eastern states, where the highway system is fairly well developed, were quick to oppose the appropriation of \$100,000,000 as proposed by the Senate Committee on Post Office and Post Roads. Senator Lodge of Massachusetts, Republican leader in the Senate, insisted that it was only fair to the taxpayers of the country that economies should be made in road expenditures as well as in other forms of governmental enterprise. He declared that it would be at variance with the administration's program of economy.



## Maximum Capacity of 5 Tons in Texas

### Trucks Under New Ruling Taxed According to Carrying Capacity and Tires

AUSTIN, TEX., Aug. 24.—Motor truck operators are much relieved by the passage of a bill by the legislature repealing the more objectionable features of the "motor truck law" which was enacted at the last regular session of the law-making body. As the measure finally passed both branches it increases the annual license fee on commercial vehicles according to net carrying capacity and tire equipment, but the mileage tax imposed by the regular session of this legislature is eliminated. Trucks used exclusively for agricultural purposes are exempted from the special license fees stipulated in the bill, but it is provided that license fees shall be paid on agricultural trucks according to horsepower just as now paid by automobiles.

Under an amendment adopted by the conference committee a license shall not be issued to any truck of more than 4 tons carrying capacity, except on written application to the Highway Commission showing that roads would not be injured by such trucks. The bill provides, however, that no license shall be issued to trucks of more than 5-ton carrying capacity.

Another section of the bill provides that county road superintendents or supervisors may during wet weather prohibit the use of any highway to loads of such weight as would damage the roads.

Speed limits are fixed according to gross weight of vehicle and load and according to tire equipment. Pneumatic tire equipment is favored in this as well as in the case of license fees, higher speed limits being allowed vehicles equipped with pneumatic tires as lower license fees have been provided for such vehicles.

All trucks must be equipped with rear-view mirrors and no truck shall operate with solid tires less than 1 in. in thickness at any point or with pneumatic tires where one of such tires is missing. Drivers operating cars in this condition are subject to penalty of not more than \$200, as are also those drivers who operate vehicles of more than 4-ton carrying capacity without special permit.

Following is the scale of license fees provided for commercial motor vehicles, which are defined as any motor vehicle designed for the transportation of property:

**Carrying Capacity (Lbs.)—1 to 2000**  
pneumatic tires, \$15, solid tires, \$18; 2001 to 3000 lbs.: pneumatic tires, \$30, solid tires, \$36; 3001 to 4000 lbs.: pneumatic tires, \$40, solid tires, \$48; 4001 to 5000 lbs.: pneumatic tires, \$50, solid tires, \$60; 5001 to 6000 lbs.: pneumatic tires, \$65, solid tires, \$78; 6001 to 7000 lbs.: pneumatic, \$80, solid, \$96; 7001 to 8000 lbs.: pneumatic, \$100, solid, \$120; 8001 to 9000 lbs.: pneumatic, \$120, solid, \$144; 9001 to 10,000 lbs.: pneumatic, \$150, solid, \$180.

For each trailer or semi-trailer drawn by a commercial vehicle or tractor, per 100 lbs. gross weight of vehicle and capacity load equipped with pneumatic tires, 15 cents; solid

rubber tires, 25 cents; iron, steel or other hard tires, 35 cents.

Provided, that semi-trailers equipped with iron, steel or other hard tires shall pay at the rate of \$1 per 100 lbs. of gross weight as specified under this section.

Following is the speed limit scale: Commercial vehicles equipped with pneumatic tires: maximum weight in pounds, including gross weight of vehicle and load:

2001 to 4000, 22 m.p.h.; 4001 to 6000, 18 m.p.h.; 6001 to 8000, 15 m.p.h.; 8001 to 10,000, 12 m.p.h.; 10,001 to 12,000, 10 m.p.h.

Commercial vehicles equipped with solid rubber tires: maximum weight in pounds, including gross weight of vehicle and load: 1500 to 2000, 20 m.p.h.; 2001 to 6000, 15 m.p.h.; 6001 to 8000, 12 m.p.h.; 8001 to 10,000, 10 m.p.h.

### Decision Holds Indiana Laws Constitutional

INDIANAPOLIS, IND., Aug. 22.—Holding the Indiana motor vehicle registration law constitutional, Judge Moll in Superior Court, yesterday denied a temporary injunction to prevent enforcement of the law in the case of William S. Frye, transfer and motor transport operator, who attacked the measure in a suit filed Aug. 2.

The court decided the registration act was not discriminatory, confiscatory or invalid because of the faulty title, as alleged in the test suit, which followed the arrest of more than 100 motor truck operators by Indianapolis police and deputy sheriffs of adjoining counties.

In commenting on the allegation that the act took property without due process of law, Judge Moll held that the imposing of a license tax on motor vehicles was not assessing a property tax, but was merely collecting a privilege tax.

### Believes in Unit Repair System

INDIANAPOLIS, IND., Aug. 18.—George Turner, president of the Fashion Dry Cleaners and owner of a fleet of trucks, has an idea on truck operation. After some months of investigation and checking, Mr. Turner found that about 99 per cent of his truck tie-ups were because of engine trouble or rear system trouble. He did not count tire trouble because he said it did not take a mechanic to fix this trouble. He does not maintain a mechanic, but he does keep on hand at all times one complete engine, without chassis, and one rear system, both in first-class condition at all times. In case anything happens to one of the trucks in service, it takes a couple of men at the plant who know how, about 1½ hr. to take out one engine or rear system.

### Coming Events

1921

September, 1921—Sacramento, Cal. Seventh annual truck show during State Fair, State Agricultural Society, Sacramento.

Sept. 5-10, Indianapolis, Motor Vehicle Show, Indiana Fair Grounds.

Sept. 9-17, Ottawa, Ont., Motor Truck Show, Howick Hall.

Sept. 28-30, New York City, Electrical Show, 71st Regiment Armory.

Sept. 2 weeks, Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.

October 12-14—Chicago, Annual Convention of the National Implement and Vehicle Assn. H. J. Samiet, Sec'y., 72 West Adams St.

Oct. 24-29, Oakland, Cal., Annual Convention International Traffic Officers' Assn., Municipal Auditorium.

## Indiana Truck Owners to Organize

### Big Business Associations Want More Adequate Legislation for Trucks

INDIANAPOLIS, IND., Aug. 24.—For the purpose of securing adequate legislation, work has been started on the formation of an organization of commercial vehicle owners in Indiana which will likely be the most powerful organization having to do with motor vehicles in the State. It is certain the organization will represent in capital invested more financial authority than any other motor organization. Preliminary meetings have been held recently in Indianapolis under the direction of L. M. Shaw, manager of the Indiana Automobile Trade Association and Tom Snyder of the Indianapolis Transfer Association.

At the present time the commercial vehicle owners are more concerned with a test case in a local court concerning registration for trucks entailing a charge of \$15 per ton capacity than in anything else. Later, with this case out of the way, it is planned to devote the energies of the organization, which likely will be known as the Commercial Vehicle Owners Association of Indiana, toward securing beneficial legislation and good streets.

The following organizations of different business classifications have signified their support of the new movement: Indianapolis Coal Dealers Association, Indianapolis Sand and Gravel Association, Indianapolis Retail Grocers Association, Indiana Automobile Trade Association, Indianapolis Transfer Association, Master Plumbers Association, Indianapolis Automobile Trade Association, Indianapolis Wholesale Grocers Association, Indiana Transfer & Warehousemen's Association, Indiana Association of Electrical Contractors, Indianapolis Commercial Warehousemen, Indiana Bakers' Association, Portland Cement Association, Indiana Highway Transport & Terminal Association and the Indianapolis Ice Dealers' Association.

### Electric Vehicle Show Sept. 28

NEW YORK CITY, Aug. 16.—With exhibits of commercial trucks, industrial trucks, storage batteries, and garage accessories, the electric truck display at the New York Electrical Show will be very comprehensive. The show this year is to be held at the 71st Regiment Armory, Park Avenue and 34th Street, instead of at the Grand Central Palace. It opens on Wednesday, Sept. 28, and will continue for 10 days.

Among the manufacturers of electric vehicles and vehicle supplies who have already taken space are the Commercial Truck Co., the Lansden Co., the Walker Vehicle Co., the Ward Motor Vehicle Co., the Steinmetz Electric Motor Corp., Walter Motor Truck Co., and the Baker R & L Corp. Storage batteries will be shown by several companies.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. C. Building  
239 West 39th Street, New York

## CONTENTS

Vol. XXV, No. 4

September 15, 1921

### LEADING ARTICLES

Successful Daily Delivery Plan .....	8
How Service Sells Service.....	10

### MISCELLANEOUS ARTICLES

The Right Sized Tire Means Bigger Profits .....	12
When Solid Tires Should Be Replaced..	13
Motor Trucks in the Stockyards.....	14
The Tractor-Trailer Field.....	15
What Does Your Truck Cost?.....	16
Being a Success and Then Some— .....	19

### DEPARTMENTS

The Better Way .....	20
Buyer's Department:	
Ruggles Enters Field With 1-Ton Truck.....	24
Apex 1-Ton Speed-E-Livery Model in Production	24
Eugol 1-Tonner a Newcomer in the Truck Field	26
Truck Accessories.....	26
Shop Equipment for Fleet Owners.....	28
Hydraulic Elevated Trolley Tower Truck.....	30
Motor Truck Electric System Wiring Diagrams ..	31
The Fleet Owners' Forum.....	32
Editorial: Insuring the Load.....	34

### NEWS

Maine Limits Weight of Trucks.....	35
Indiana Association Makes Progress.....	35
New England Roads to Fight Trucks.....	36
Buses Displace Trolleys in Des Moines.....	36
New Use for Trucks in Oil Fields.....	37
Ford Prices Lowered Third Time.....	37
Companies Against Theft Coverage.....	38
To Rebuild Trucks in Atlanta Plant.....	38

Index to Advertisers.....62-63

## The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT

David Beecroft, Directing Editor

Sinclair Gluck, Managing Editor

F. Eugene Spooner, Technical Editor

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

Chicago, Malters Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law .....	50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

## THE ZENITH CARBURETOR

*Has Been Used As  
Standard Equipment*

*for 7 years*

by **ATTERBURY**  
**ARMLEDER**  
**STEWART**  
**NETCO**  
**HALL**

*for 6 years*

by **FEDERAL**  
**DAY ELDER**  
**COMMERCE**  
**VIM**  
**WITT WILL**  
**FORSCHLER**

*for 5 years*

by **CLYDESDALE**  
**KELLY-SPRINGFIELD**  
**FAGEOL**  
**ROWE**

and by over fifty others for 1, 2, 3 and 4 years, BECAUSE—

It does its work well.

It gives power with economy.

It is simple in construction.

It cannot be jarred out of adjustment.

The truck-master can take control of the adjustment out of the drivers' hands.

You can put ZENITH equipment on any truck. Write us or call our local branch or service station for details.

**The Zenith Carburetor Co.**  
New York      Detroit      Chicago

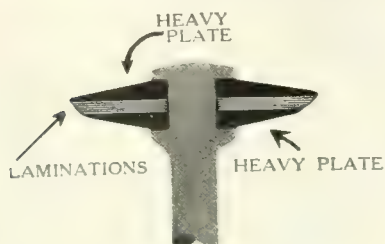


# Flexedge Valves

*Never Need Grinding  
and Always Hold Compression*

## NOTE

This is the fourth of a series of articles explaining the construction and operation of Flexedge Valves. The next article will be in Commercial Vehicle Oct. 15. Look for it.



## The Result of Many Years Experimenting

EXPERIMENTS with laminated valves have covered years and years of continual effort. The desired goal was to produce a *flexible* valve head which at the same time would have *stability*. But not until the Flexedge Valve was produced had this goal been reached.

The illustration shows the construction of the Flexedge Valve head. Note that the laminations are held between heavy plates at top and bottom and note that these plates are *tapered*. Here we have the long sought combination—flexibility with stability.

This is how a Flexedge Valve operates. When the valve head strikes the seat under the tremendous pressure that brings it down on the closing stroke, the edges of the laminations are flexed about 1/1000", which frees the seat of any carbon that has been deposited. A clean, bright seat and an absolutely compression-tight seal are the results. Loss of power is stopped—fuel mileage is increased—time and money spent for regrinding valves are saved.

The remarkable performance of Flexedge Valves is responsible for their nation-wide success. Made for all truck motors, regular and oversizes. Write for literature, price lists and complete information.

## SELF SEATING VALVE CO.

340 W. HURON STREET

CHICAGO



# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXV    Sept. 15, 1921    No. 4

## THE PIONEER SPIRIT OF TRUCK TRANSPORTATION

*This is  
D. S. Woodberry,  
founder of  
the business  
where business  
had not  
• been found  
before*



*The next  
two pages tell  
how he  
built up a service  
with warehouse  
facilities which  
paid both him and  
his clients*

***“I Believe in Looking for Business Where  
Business Has Not Been Found Before!”***

# Successful Daily Delivery Plan

*Deliveries and Rates Planned by Zones  
and Based on Accurate Cost Records*

**"I BELIEVE** in looking for business where business has not been found before. That is how I built up this service of mine!"

That is a good maxim for any business man in any line of business. Applied to trucking, the principle enabled D. S. Woodberry of Boston to render a service for which there was an urgent need and so build up a really valuable business.

The D. S. Woodberry Co. has been in the forwarding business—by truck and railroad—since 1876. Since about 1912 this company has been doing the trucking for the Quincy Market Cold Storage & Warehouse Co., one of the largest warehousing companies in New England. Mr. Woodberry's connection with the warehousing company in a forwarding capacity gave him an insight into the service that this company was rendering. Believing as he does, in looking for new business where business has not been found before, his observation of this service led him to see a way in which, through his co-operation, the warehouse could render a still greater service to the shippers and dealers in and near Boston.

## How the Business Grew

Two years ago, therefore, Woodberry laid his plan before George S. Lovejoy, manager of the general storage department of the warehouse. Lovejoy approved and the two men worked the plan out together.

The idea was to offer a daily delivery

service to all the communities within a distance of about nine miles of Boston. Lovejoy worked on the warehouse end of the service and Woodberry worked on the delivery end.

A careful compilation of costs was the first step. This indicated that a service could be rendered which would not only save the shippers a great deal of time but which would be cheaper than teaming plus freight. So a schedule of charges was worked out and the plan was given a trial.

As a result, the Woodberry company now has five trucks busy all the time, doing highly profitable trucking. Moreover, it looks as if this number would shortly be doubled. And, in addition, there is a prospect that, within a few years, some 30 5-ton trucks will be required to do the work now in process of development.

At first, when the company got under way with the daily service plan, there was a good deal of freight congestion on the railroads. The daily service offered proved especially attractive because of this congestion.

Later came the business depression and a new set of conditions. Strange to say, these proved even more promising for the plan. When prices began to fall, dealers began to stop buying. When they did buy they bought in the smallest possible quantities. To-day, they are still buying in small quantities.

Now it does not matter whether the salesmen of the manufacturers are selling direct to the retailer or to wholesalers. If the salesmen can promise im-

mediate delivery on these small orders and can show that orders of practically any size can be delivered within 36 hours after the order is booked, he is able to take more orders than he could if he had to make larger sales and could not promise delivery as promptly.

The trucking service that the Woodberry company is rendering is making these deliveries possible. With daily morning and afternoon deliveries, it is possible usually to deliver in the afternoon the orders received in the morning. At the latest, it is possible to deliver the next day all orders that are received on any one day.

But now that the business is built up, it is highly improbable that a return to normal business conditions will tend to reduce the business done by the haulage company.

## Zones Based on Costs

The service was started with one 1-ton high speed truck. To-day there are five trucks in service, three 5-tonners and two 2-tonners. The volume of business being handled is constantly increasing. It is also working out to the great advantage of everyone concerned.

The area in and around Boston is laid out into four delivery zones. These zones are laid out on a basis of delivery cost rather than that of distance. The condition of the roads that have to be traversed must be considered in estimating the costs. The density of the population—which means size of load which may be counted upon—and all other factors entering into the cost are given due weight in laying out the zones.

The rates for all communities within a given zone are the same. In order to keep the rates at a minimum and at the same time ensure a profit on the work, it has been necessary to figure costs with the greatest possible degree of accuracy. For example, the deliveries are all store door deliveries. If any further handling is required, it must be paid for extra.

The company found that the size and weight of the goods handled in the container altered the cost. For example, rolls of rugs and linoleum which are not crated, cost more to handle and deliver than those which are crated. Wooden boxes can be handled at less cost than cardboard cartons.

The volume of business that can be depended upon from any one shipper also has its effect upon cost. It is cheaper per hundred pounds to handle a large volume, where the deliveries to each store average large, than it is to handle a smaller volume of goods. This means that the schedule of rates is not exactly simple.



*One of the D. S. Woodberry trucks which has helped build up a successful daily delivery service in conjunction with the company warehouse. The trucks make daily morning and afternoon deliveries in the territory around Boston*



Once these data are given, however, and the rates figured, they remain the same in any given case for all the communities in a given zone. The rapid growth of the business is making it necessary to revise costs every six months to make sure that they are correct. It makes a careful study of costs very important. It also makes it necessary to control the operation of the trucks as closely as possible.

In this service the distances that the trucks should cover each day are known with accuracy. A comparison of the known distances with the readings of the mileage meters on the trucks shows whether or not the driver has been joy riding with the truck. Excessive speed is prevented by using a locked speedometer with a maximum speed indicator, the maximum hand of which the driver cannot move back without the key which Mr. Woodberry keeps in his possession. This has been effective in holding the speed of the trucks down to a safe point.

This holding down of the speed to a safe point is especially important in this service for the reason that fast driving runs up the repair bills to such an extent that all the profits may be absorbed—and since this work is done on contracts covering several months, it is not possible to revise the rates to meet any increased depreciation or repair bills.

In this service, the trucks serving the towns in the outer zones often cover as much as 100 miles a day. They make two round trips and cover several towns. It is expected, however, that the business will develop to such an extent that it will require a truck to each of the larger towns.

### Warehouse Co-operation Needed

A unique feature about this line of trucking business that Mr. Woodberry has built up and which shows so much promise for the future is that it is new and is so free from competition. It is a line of business that cannot be made highly successful under present conditions without the co-operation of a warehouse.

To-day there are many manufacturers selling directly to the dealers. Most of these manufacturers find it more satisfactory and cheaper to employ the services of some established warehousing company than to establish their own warehouses and delivery systems. A warehouse without a satisfactory delivering system, however, does not meet the entire need. There are many manufacturers who are meeting with a good many difficulties in solving their distribution problems on this account.

Independent deliveries through local expressmen do not give all the service that is desired. It is only when daily deliveries are made direct from the warehouse that the most satisfactory service is effected.

There are only a limited number of warehouses in any community. Some of these warehouses have not enough business so that operating their own fleet

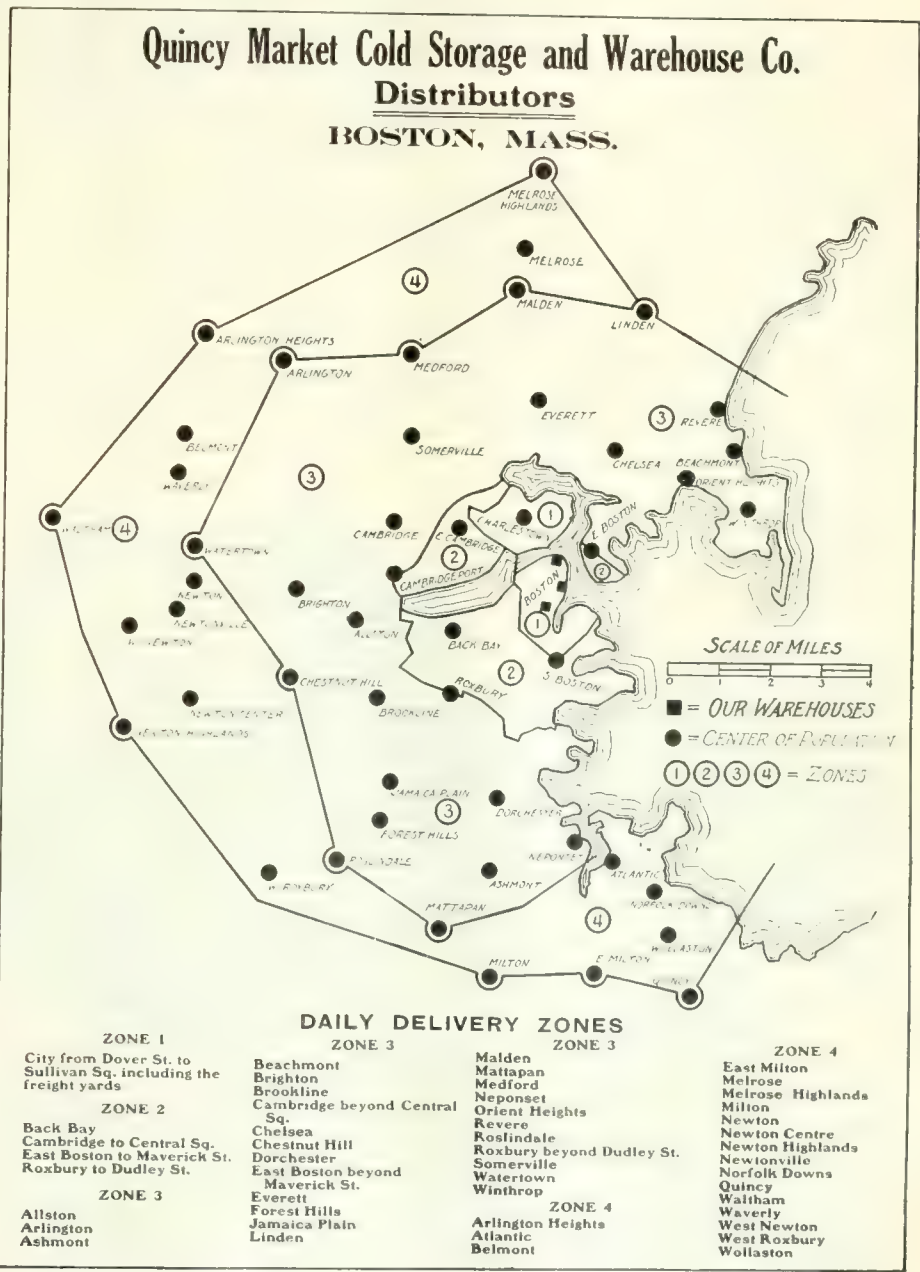
of trucks would prove an economy. Others have found it more satisfactory to make contracts with local trucking companies which makes it possible to draw upon the trucking companies' trucks to meet peak demands without being forced to pay interest and depreciation on a fleet large enough to take care of the peaks.

### Warehouse Good Prospect

Warehouse companies, therefore, prove good prospects for the trucking company rendering an efficient and reliable service. The delivery service brings the two into closer co-operation. Any attempt of other trucking companies to take away the delivery business is pretty certain to fail because without the co-operation of the warehousing company the other company cannot do the business at

a profit owing to the smaller volume of business handled. This limits the delivery system to the number of warehouses there are in town and offers the trucking company an opportunity to build up a large business that is profitable to all concerned, the shipper, the warehouse company, and the dealers as well as the trucking company itself.

This delivery system, however, is only one of the non-competitive opportunities for increasing the size and the profits of a trucking business that the changing conditions in business are bringing about. A close watch of changes in business methods will show others that are just as promising. As a matter of fact, this delivering system is not an entirely new idea. It is merely adapting the co-operative deliveries of retail stores to the needs of the manufacturers, as was tried out during the war.



The territory covered by the trucking company and the different zones to which deliveries are made around Boston. The charges per hundred pounds remain the same for deliveries anywhere in the same zone and these charges are based on accurate operating costs

# How Service Sells Service

And  
Keeps  
Customers



**T**HE motor truck is no longer a novelty. It is an established factor in industry. It follows that the service done by the truck is no longer a novelty. Therefore, the success of the truck operator already depends upon the *quality* of the service performed by his truck.

The first passenger hauled by the earliest of locomotives had no thought to spare to the quality of the accommodation. The ride was a novelty, and it made no difference to them whether the seats were comfortable or the conductor polite. But this is all changed to-day. The railway train is an accepted factor and the passengers have plenty of time and inclination to criticize the service.

## Quality Beats Competition

The same thing applies to trucks. At one time it was a novelty to have one's purchases delivered by a thumping, clanking gasoline vehicle instead of by the well-known Dobbins. If the driver of the vehicle was covered with grease and the parcel was too, why it was all part of the novelty. But those times are past. Nowadays the purchaser has very definite ideas on efficient, courteous motor truck delivery. If he gets it, it is a score for the retailer. If the purchaser does not get it, the retailer very probably loses a customer.

At the first glance the above might not seem to apply to retail coal delivery. Coal is hard to get as a rule. Many householders have been almost trained to a state of mind where they regard it as a personal favor if their coal dealer consents to take their order.

But where there is a demand there will inevitably be competition in filling

that demand. And the coal dealer's business is not the same all the year round. While, for part of the year, he may have more orders than he can fill; for another part of the year his business may be slack—and that is the time when he needs to take orders away from his competitors—that is the time when the quality of the delivery service rendered by his trucks will help him to take those orders away from his competitors.

Therefore, it is up to the progressive coal dealer to realize that when he sells

country, has fully realized the value of quality delivery service. The delivery methods show it; the instructions to the drivers show it; and the company's publicity material shows it.

## What Does Service Mean?

In the view of the Milwaukee-Western Fuel Co., the purchaser who buys coal from them buys also the best quality of delivery—the best truck service—that careful planning and careful supervision can give. What does service mean? In this connection it means prompt consideration for the customer's property and this means clean delivery, when, where and, as nearly possible, how the customer wants it.

Quality delivery service of this sort involves many considerations on the part of the coal dealer. In the first place there are two distinct types of coal delivery. There is the delivery where the coal can be dumped direct from the truck into the customer's coal bin. There is also the delivery where the coal cannot be dumped owing to the distance of the bin from the street and where the coal has to be carried in by hand.

In coping with both these classes of delivery, one of the first considerations is naturally the question of what type or types of dump body will be most serviceable.

## Two Types of Bodies Used

In Milwaukee, the Milwaukee-Western fleet is composed entirely of Pierce-Arrow trucks. There are thirty-three 5-tonners and one 1½-tonner. These trucks replaced 175 horses, 105 wagons and about 75 teamsters.

Seventeen of these trucks are equipped with the ordinary tailgate dump bodies, manufactured by the Pierce-Arrow com-



*Mr. Brodie, superintendent, explaining the repair of a hoist body side gate*

coal to be delivered by his trucks, he is selling more than the coal. He is selling the best delivery service possible, not only in promptness but in quality and convenience to the customer.

The Milwaukee-Western Fuel Co., one of the largest coal companies in the



pany. These bodies are used for deliveries where the coal can be shot straight into the customer's bin from the truck tailgate, and where it is possible to maneuver the trucks into position for a tail-gate dump.

The remaining sixteen trucks are equipped with Monarch-Eureka patent bodies manufactured by the Thomas Wright Co. of Jersey City, N. J. These bodies are used for side dumping and for deliveries where the coal has to be carried across the sidewalk in baskets and then dumped.

Delivering coal in Milwaukee means, in many cases, a long walk from the truck to the coal bin. In that city it is illegal to dump the coal in the street and go away and leave it. Therefore, it is obvious that a delivery of this sort, where the coal has to be carried to the house in baskets, will be a very expensive proposition if the truck is held up while the delivery is being made.

### Speeding Up Delivery

Under the circumstances, the truck is held up and must be held up while the coal is being carried in. Therefore, the only thing that remains to be done, if the cost of delivery is to be held to a minimum, is to use equipment which will speed up that delivery work as much as possible under the circumstances.

This type of hoist body helps a lot in that way. The body is built so that it can be hoisted vertically to a considerable height without tipping in any way. When so hoisted, the chute at the side is well above the height of a man's shoulder. Thus there is no lifting of baskets, which is the hardest part of delivery work of this type.

For this type of delivery, the driver is accompanied by three helpers. When the point of delivery is reached, the baskets to be filled are hooked on just under the hopper at the side of the body. The baskets are filled by the driver and carried in by the men. The filling itself is almost instantaneous and as there is no lifting to be done this type of body materially speeds up deliveries of this type.

When the coal has to be carried in this way, the company charges 75 cents extra per ton. But in spite of this, the profit is actually less on a load of coal which has to be carried in than on a load which can be dumped direct, because of the loss through holding up the truck during the lengthy delivery and the extra wages involved in carrying the coal in.

### Considering the Customer

So much for the question of cutting down the cost of these hand deliveries. But there is also the question of the customer—whether or not he is pleased and satisfied with the delivery service rendered him.

The instructions given the driver and his helpers are as rigid in the question of quality service as they are on the question of speeding up deliveries. When coal has to be delivered by hand, the men are first required to consider the customer's lawn. If the coal must be carried across the lawn the men are required to lay down serviceably wide plank walk on which

to pass to and fro and to be particularly careful not to drop coal from the baskets in transit. One of the accompanying illustrations shows how this is done.

The second consideration is the customer's paint. Where the baskets have to be dumped through a window in the immediate vicinity of paint-work, the



*How the customer's house paint is protected. This driver is cleaning up after the coal has been carried in*

adjoining paint-work is covered with tarpaulins to protect it. How this precaution is taken is shown in another of the accompanying illustrations.

Finally, when the men have completed the delivery, they are instructed to clean up the premises and leave them spick and span.

Whether the coal be delivered by hand in baskets or by means of a chute from the truck, there is always the coal dust evil. Coal dust is amazingly light and

penetrating. If there is very much of it allowed to escape from the clattering coal as it flows into the bin, it will penetrate through closed windows and leave a fine, slightly greasy coating of dust all over the customer's house. And this means anything but a satisfied customer.

Flying coal dust can to some extent be prevented by damping down the coal before the truck leaves the yard. The Milwaukee-Western loads are always damped down in this way in the summer and autumn. By the time the truck reaches the point of delivery, most of the dirty water has run out, so that it will not get the men wet nor dirty the customer's property, but the coal is still damp enough so that the dust will not fly to any great extent.

However, coal dust sometimes presents an apparently insurmountable problem. A certain amount of coal must always be delivered in the winter time. If the temperature is below freezing it is obviously impossible to damp down the coal, because by the time the point of delivery is reached the coal in the truck body will be frozen solid and cannot be dumped, even into baskets.

The Milwaukee-Western overcame this difficulty as a rule by using snow for damping down the dust. Once last winter, however, in freezing weather, there was no snow on the ground and a load of coal was sent out without damping down of any kind. As a result the customer's house was filled with coal dust and the company upheld their boast of real delivery service by spending several hundreds of dollars to have the house renovated. But the problem still awaits solution when no snow is available.

Altogether the company's policy of selling delivery service as well as coal has played a big part in building up one of the biggest businesses in that part of the country.



*This view shows how the driver and his assistants lay a wide boardwalk to protect the customer's lawn, when there is no other direct route. It also shows that no stooping is necessary to load the baskets*



# The Right Sized Tire Means Bigger Profits

*A Discussion of the Merits of Pneumatics and Solids on Trucks Used in the Haulage of Gasoline and Other Petroleum Products*

By F. A. Bean\*

BECAUSE of the class of work to which trucks in the delivery of gasoline and other petroleum products are placed, their maintenance charge is usually much higher than it would be in other lines of industry for a similar mileage or period of time which in turn increases the cost per ton-mile or per gallon of delivery.

As a result, extreme care should be used in purchasing the chassis. If specifications are carefully written at the outset, the truck company will know just what is expected by the oil company and it will save a great deal of useless argument and a considerable loss of time.

It must be remembered that a chassis delivered in accordance with a rigid specification will involve a greater first cost but on the other hand the maintenance and operating cost will be reduced during the normal life of the truck to such an extent that the final cost should be considerably lowered and therefore the unit cost of delivery of this same period will be lessened.

The first item to be considered in these specifications is that of tires. While the pneumatic cord tire is more or less in an experimental state, it is generally agreed that it is the proper tire for the smaller capacity trucks, from the standpoint of increased speed, increased traction, increased tire mileage and reduced chassis maintenance on account of reduced vibration and resulting decrease in actual depreciation and decreased fuel consumption. It must not be thought that the pneumatic cord tire has no faults. Against the above are some features which tend to slightly offset them; they are the high cost, the reduction of high gear ability, limitations on braking power and time consumed on road in making changes.

The introduction of pneumatic tires for truck service includes the probable increased size of engines as well as the possible necessity of redesigning them entirely, also extremely important changes in transmissions, differential and brakes.

In certain cases where comparative statistics have been kept on trucks in other lines, it has been developed that those

equipped with pneumatic cord tires show a reduction in repair bills of as high as 60 percent and a saving of fuel about 25 per cent to 30 per cent. Some engineers are of the opinion that they can at the present time be profitably used up to and including the 4-ton models, while others are of the opinion that 2 or 2½ tons is the maximum capacity for tires of this class. They, however, are frank to say that they believe that future developments will make it the proper tire for some of the larger capacity trucks.

As a matter of fact, at the present time, tires of this class are not being

manufactured on a commercial basis to care for a truck of over 3-ton capacity.

When this type of tire is used it is very essential that it be kept inflated up to the required pressure for the weight carried which they are carrying.

It has been the writer's experience that when solid tires are used, either in the city or on country roads, they should be of the single type. The dual type of tires will not wear evenly on both the inside and outside of the same wheel or on opposite wheels. This condition necessitates the dual tires being changed more often than single tires, otherwise one wheel will be carrying more than its proportion of the weight which causes severe strains in various parts of the chassis. A similar condition exists when a wheel equipped with dual tires meets an obstacle not large enough to engage both tires. The result is a tire temporarily overloaded and consequently unable to protect the truck mechanism from the resulting shock.

Comparatively few trucks are delivered from the factory, except on special order, with tires sufficiently large to give the very best results. The oversizing of the tires on a truck will do just as much to increase the life and reduce the maintenance cost, fuel bills, etc., as the same practice will on a passenger car.

However, it must be remembered that there is a limit to this oversizing. A tire that is too large is as grave a fault as one that is too small. Do not confuse "oversizing" with "overtiring." If the rear wheels are overtired for the weight to be carried the engine becomes overloaded unless the chassis was originally overpowered. When the front wheels are overtired there is a tendency for the truck to steer hard and an unnecessary strain is brought upon the steering knuckles.

The table attached to the specification showing tire sizes has been very carefully prepared and engineers generally agree that it will give good results on the majority of trucks which are suited to distribution of petroleum products.

To a fleet of trucks covering all of the capacities it will mean the stocking of a minimum of sizes and the stocking of sizes which are in line to become obsolete so far as is now known.

**Table Showing Range of Maximum Loads for Pneumatic Cord Truck Tires, as Recommended by the Principal Tire Manufacturers**

*Figures in bold face type are the loads most generally recommended*

Inflation Pressures		LOAD CAPACITIES									
100 lb.	120 lb.	140 lb.	160 lb.	180 lb.	200 lb.	220 lb.	240 lb.	260 lb.	280 lb.	300 lb.	
60	850	1020	1400								
65		1080	1500								
70		1140	1550	1800							
75		1200	1600								
80			1700	1800	2500	3175					
			2000								
			2200	2400	4500					1000	
				2700							
				2775							
100				3000	3500	50				600	
				3000	3000	4350					
					3725						
110				2400	2000	3600	4000	5000		5000	
					4000	4000					
120						4000					
						4000					
							5000	5000		3650	
130								5000		3650	
								4250	5000	8000	
										6000	
140									5350	6000	
150										6000	



It is very noticeable that the tires shown in the list as being furnished by the truck manufacturer are being used on the front and rear in every conceivable combination.

The great range of sizes now being furnished by the various manufacturers is due to the variance in the weight of the chassis and the distribution of the load between the two axles; also to the practice of a great number of the truck manufacturers in furnishing the tire companies the specifications of their

truck and then using the smallest size tire which can possibly be expected to carry the entire weight of the truck with its load, although in many cases it is not the size recommended by the tire manufacturer as being the proper one to give the most economical mileage.

This is done for the purpose of reducing the cost of the chassis and is of course a question entirely of trade competition.

The better way for the oil company is to accurately ascertain the weight of

the chassis they are to purchase; add to this the weight of the body and live or pay load; ascertain the percentage of load applied to each axle of the chassis in question and then specify the size of tires desired.

To facilitate this work the foregoing tables show the range of maximum weights as recommended by tire manufacturers for the various sizes of both single solid tires and pneumatic cords. The figures shown in heavy type are those most generally used.

## When Solid Tires Should Be Replaced

By Chas. Guernsey\*

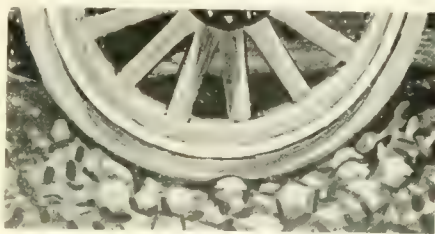


Fig. 1

From the available information and data on the subject the writer has formed the following conclusions:

A truck operated under unfavorable conditions, or cobblestones or rough macadam should have the tires replaced when they have worn down the rubber

rim from which the rubber has been worn almost entirely away.

Another feature that enters into the question is the present systems of adjustment used by the tire companies. It would be more practical if they would make settlement on the basis of the desirable life of a tire, instead of on the absolute mileage it is possible to get before the rubber is all gone.

If they were to adjust solid tires on the basis of 1 in. from the base, truck users would then have one less temptation to keep on operating old tires after they have passed the danger point.

It has been found that tires which wear flat on the surface and which separate from the base have given the most trouble to some of the large fleet owners. Flat tires may be caused by imperfections in the tires themselves or by improper care on the part of the truck driver. In the latter instance, a too sudden application of the brakes most often produces flats since the rear wheels become locked and slide along the surface of the pavement without revolving in the ordinary manner. This causes an excessive friction at the point of the tire with the ground, with the result that the tire at that point is worn slightly out of round.

Base separation when the tire is not defective may be caused by changing the direction of the truck motion too suddenly while it is traveling at a good rate of speed. Turning the front wheels to a cramped position to get away from the curb while the truck is standing still also produces an excessive side thrust that tends to tear the soft tread rubber away from the hard rubber base.

Other pointers which the owner can follow with good results in order to obtain greater tire mileage include a strict inspection of the truck loading and a close supervision of the drivers to prevent overspeeding. Overloading and overspeeding are two of the most important causes for rapid tire wear.

SOME time during the life of a solid tire, a point is reached when it becomes most economical to replace it. The replacement of tires cannot be based on any one fixed scale. Some tires will wear down smoothly and evenly, while others will be badly chipped and deformed; further, the conditions under which the truck is being operated as to speed, load, road, etc., all have a very material bearing upon the question.

A truck chassis can suffer more damage in driving 1 mile with insufficient rubber on the tires than will be done in 1000 miles of normal operation with good tires. In Fig. 1 there is sufficient rubber left on the rim to take up the shock from rough roads.

The life of a motor truck depends on two things: First, the useful life of the wearing parts such as bearings, gears, cylinder walls, pistons, etc.; second, the length of time the parts which are sub-

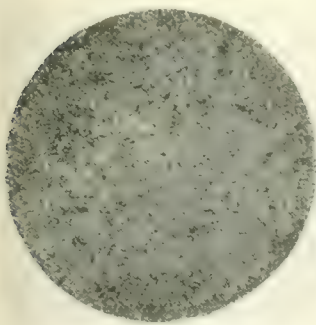


Fig. 2

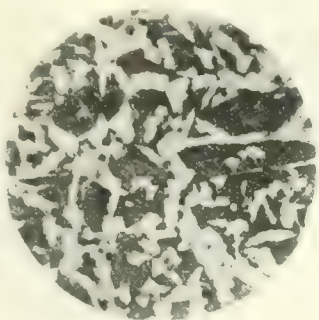


Fig. 3

Cross section views of steel before and after crystallization has taken place

ject to shock will operate before they break from fatigue. Any piece of steel that is stressed to any great extent will eventually fatigue and break by crystallization. Fig. 2 shows the texture of steel as it appears through the microscope. Fig. 3 shows the same piece of steel after crystallization has taken place.

In the case of a motor truck the parts affected in this way are springs, axle centers, spindles, steering arms, rear axle shafts, etc. When the tires are worn down, the strains on the spindle of the front axle, for instance, are many times greater than when they are new. By seeing that the tires are changed at the proper time, the life of any truck can be greatly lengthened.

to within 1 in. of the steel base. Under the most favorable of conditions, the tires should be replaced when the rubber has been worn down to within  $\frac{3}{4}$  in. of the steel base.

Fig. 5 shows a rim cushioned with rubber to the depth of  $\frac{5}{8}$  in. The rubber is in bad condition and offers but little protection. In Fig. 4 is shown a

Two examples of badly worn solid tires



Fig. 4



Fig. 5

\*Chief engineer, Service Motor Truck Co.



# Motor Trucks in the Stockyards

## Farmers Compete with Railroads in Short Hauls to Market Stock

**M**OTOR trucks are rapidly altering transportation conditions in the Middle West, adding new problems in the economics of financing and note issues for old established transportation systems.

On June 7, this year, motor transport fleets centering at the Kansas City stockyards delivered 1000 head of sheep at the stockyards before 10 a. m. Total sheep receipts for the day were 9000 head. This number of sheep came in by 52 trucks, some of them double decked. The maximum radius of their operations was 45 miles, and the major portion of the haul was over unsurfaced roads. The average running time for a 45-mile haul was six hours, and in these long or maximum hauls, most of the run was made after midnight, and timed so as to arrive at the stockyards about 6 a. m.

In addition to the 1000 head of sheep that came in by 52 motor transports on June 7, about 500 head of cattle and swine were delivered by the same method on this day. Double decked bodies were used in most instances where swine were brought in, except in the case of the larger trucks, where a single deck was large enough to make the capacity load.

### The Return Trip

In most instances the maximum load that can be hauled over the present highway system in territory tributary to the Kansas City markets is four tons. This maximum is set by the load bearing power of bridges and culverts on the roads traversed by these motor transport routes. A majority of the motor transports are owned by farmers, who bring in a truck load of livestock and return loaded with supplies for merchants in the country towns along the return route. Many farmers make the return trip with a load of manure, taken on at the dumping docks of the Kansas City stockyards company. The fertility of land in the vicinity of Kansas City has been greatly augmented by reason of this return haul of manure, since trucking to the yards was inaugurated.

Rates charged by motor transport operators are virtually the same as those charged by the railways for live stock haul, and the exception is in a greater charge by motor transport operators. Farmers who are complaining against excessive rail rates under the horizontal increase of Aug. 26, 1921, state that motor transport rates, where higher than rail rates, have the advantage of lessening the time livestock is in transit between

the farm and market, and, in the case of swine in hot weather, minimize losses in transit by affording better ventilation and lessening the irritation that is attendant on leading swine into stock cars at rail heads, and subsequent unloading worry at stockyards destination. Swine are the most susceptible to heat of any farm meat animals, and the loss in transit by rail in hot weather is excessive, even with the best precautions that shippers can use in loading and unloading.

### Smaller Types Popular

Numerically, 50 per cent of the motor transport delivery at the Kansas City stockyards is made by the smaller trucks.

### Trucks Increasing Business

Our legislators are not yet alive to the fact that trucks have come to stay.

They do not yet realize how trucks have increased and are increasing business and business opportunities everywhere.

They do not realize, therefore, that unfair legislation against trucks cannot eliminate the trucks but can and does retard industrial progress.

They must be taught these facts.

A demonstration of what trucks are doing is the best method of teaching them and the story on this page is an example.

It is just one example of many.

Bear it and the others in mind when you write to your legislators.

### Hampered Trucks Mean Retarded Industry

This is particularly true of sheep, which make light loading. Cattle and swine require the heavier trucks and the capacity of the larger type of trucks can almost be secured in cattle and swine loading. At certain times of the year a large number of horses and mules are brought to this market by motor transport, but this traffic is almost negligible in the summer and fall months.

Merchandising by motor transport in and out of Kansas City has made immense gains in the past 12 months. One motor transport company increased

its capital stock as of Jan. 1, 1921, of \$25,000 to \$500,000 on June 1, and has grown from five to fifteen routes, with a maximum radius of 45 miles. This maximum haul is to Odessa, Mo., 12 miles east of the end of the Jackson County rock roads. The rail rate, first class, to Odessa, Mo., from Kansas City is 47 cents and the motor truck transport company met this rate, absorbing city collection and store door delivery. Freight is picked up by two reserve trucks in Kansas City during the day, and assembled and sorted at a central warehouse. In the case of the truck that makes the maximum run to Odessa, four hours out and four hours back, the spare time of the driver, with the aid of warehousemen, is given over to the loading of his truck for the next day run.

The trucks operated by this transport company are 3½ tons capacity, with two and three trailers of 2½ tons capacity each, with steel bodies, and burglar proof wire uppers, with canvas curtains for use in inclement weather. These trailers are loaded as through car movements and are dropped off at the towns to which their loads are consigned, and are unloaded and reloaded while the power truck has gone on to other towns and is returning. The return traffic is mostly farm products, butter, milk, eggs and vegetables. In some communities trailer trucks are taken out to be loaded by the farmers who co-operate in loading it for the return trip. This motor transport company is contemplating establishing an exclusive livestock motor transport system. The livestock commission houses at the Kansas City stockyards scramble to get the motor transport business, which is growing by leaps and bounds.

### Building Hard Surfaced Roads

Farmers pay their own freight bills in motor transporting and the commission companies do not have to take care of this clerical item in making up an account sale to their customers, thus lightening their clerical work 50 per cent on all livestock arriving by motor transport.

In the merchandise transport business the up-to-date concerns operating out and into Kansas City carry indemnity insurance for all losses and damages accruing by theft, fire or wreck.

As hard surfaced roads are extended from Kansas City motor transport radius will increase. One concern is planning to extend its radius to a maximum of 65 miles over roads that have been graded through a hill country preparatory to hard surfacing.



# The Tractor-Trailer Field

*Fleet of Trailers Reduce Costs of Transfer Work  
in Chicago for the American Railway Express Co.*

THE possibilities of the trailer in supplementing trucks have not yet been fully developed. In certain classes of haulage the trailer has a big field. This fact is appreciated by the American Railway Express Co.

Quite recently the express company has introduced the tractor-trailer system for transferring express matter between railroad terminals in large cities. The first installation was made at Chicago, where 60 per cent of the heavy express traffic is "transfer."

The step is an experimental attempt to reduce the cost of operating heavy trucks in this work. The fact that the company has since installed tractor-trailers in Philadelphia and proposes to do so in Boston indicates that the experiment has been a success.

## Fleet Makeup

The new Chicago equipment consists of four 5-ton tractors and fourteen semi-trailers of  $3\frac{1}{2}$ -ton capacity. Three tractors and twelve trailers are constantly in use, 24 hours a day, the balance of the fleet being held in reserve. The trailers have van bodies, opening at the rear only, and the doors are locked during transit between terminals. This eliminates loss through theft, holdups or droppage of packages when passing through the Loop district.

Each tractor hauls about  $1\frac{1}{2}$  loads per hour, the average distance being about 2 miles. Thus each tractor hauls practically double the number of loads previously handled by  $3\frac{1}{2}$ -ton trucks, in 24 hours, and more than three times the number hauled by horse drawn vehicles. The transfer traffic in Chicago at present averages 2800 double wagon loads per 24 hours. This does not include about 1000 loads of local outbound business hauled daily from billing stations to terminals.

By this plan the largest commercial truck fleet in the United States hopes to bring about reductions in the cost of this transfer work. It has been shown that the cost of operating a tractor and four trailers is not materially greater than that of operating one 5-ton gasoline truck. A test of comparative costs was made by the company for a period of 10 days, using  $3\frac{1}{2}$ -ton trucks and 3-ton horse drawn vehicles.

It was found that while the cost per hour for one tractor and four trailers was \$2.13, as compared with \$1.93 for the gasoline truck, the tractor-trailer method handled 295 loads, while the



**Upper View**—A number of the trailers parked at the freight loading platform in process of loading and unloading, while tractors maneuver into position.  
**Lower View**—Waiting for the doors to be locked on a load. To hitch-on, the tractor simply backs into position, which requires little time

motor truck averaged 122.7 loads. The result showed that the cost per load by the new method was \$1.42, while the motor truck cost per load was \$3.09 and the horse-drawn vehicle cost per load was \$3.69.

While merely approximate, these figures are highly significant:

One tractor and four trailers worked 196.33 hours, hauled 295 loads, cost \$2.13 per hour and \$1.42 per load.

A hired  $3\frac{1}{2}$ -ton truck worked the same time, hauled 122.7 loads, cost \$2.00 per hour and \$4.32 per load.

An express company gasoline truck hauled 122.7 loads, cost \$1.93 per hour and \$3.09 per load.

A hired horse-drawn vehicle hauled 98 loads, cost \$1.75 per hour and \$3.51 per load.

An express company horse-drawn

wagon hauled 98 loads, cost \$1.84 per hour and \$3.69 per load.

The company intends gradually to add to the Chicago equipment, so that ultimately all of this transfer business will be handled by tractors and semi-trailers. The service may also be extended to some of the large mercantile establishments, which ship in quantities large enough to warrant the assignment of a single trailer to them.

Besides safe and economical movement of freight, this system possesses another advantage, namely, loading trailers by hand trucking directly into them from express cars. This conserves warehouse space and reduces the number of handlings of the express matter. The trailers may also be placed at any convenient point for loading or unloading.

# What Does Your Truck Cost?

***Accurate Cost Records Are Essential If the Truck Operator Is to Estimate His Profits, Catch Leaks and Charge His Customers Fairly***

IN any business involving service, the cost of that service and the price charged for that service, it is obvious that certain facts must always be available for the administration of the business.

The head or heads of the business must know the field to which they cater and its possibilities of expansion, the ins and outs of the service which they intend to deliver and how that service can be maintained and improved.

But, after all, the prime essential of successful business is profit, ultimately expressible in dollars and cents. Therefore, the prime essential of successful business is an efficient system for estimating and recording costs, charges and gross and net profits. For without accurate information along these lines no business can survive.

## Truck Costs Neglected

In view of the above, it is strange that the cost of doing business with trucks is almost universally neglected, sometimes more and sometimes less, in many of its most important features.

Many fleet owners think they know the cost of operating their trucks. Many fleet owners guess at it. A few keep more or less accurate cost records. But it is very rare indeed to find a truck operator who knows to the last nickel exactly what it costs him to operate one of his trucks by the year, by the month, by the week or even by the day.

A condition of this sort would hardly be allowed to exist in any other business. But operating trucks is a comparatively new occupation. It presents bookkeeping difficulties which many un-instructed operators consider insurmountable or, at least, not worth the time required to surmount them. The result is that many fleet owners make a rough estimate of the more obvious items of expense and make a wild guess at the total of the remaining items.

How is it possible to do business on this basis? How is it possible to estimate the charge which should be made for the service of the truck? And how is it possible when such a charge has been adopted—too often arbitrarily, by mere guess work or by what somebody else charges—to estimate the profit which has accrued from the sale of that service?

If the business is to be at all successful and permanent it is absolutely essential to keep accurate records of the cost of operating the trucks. A little thought will make this obvious. But if a little thought is not given to the subject, this fact is too often made obvious by the failure of the business.

There are certain items included in the cost of operation which are comparatively simple to estimate. These will be dealt with first. But even these are subject to inaccuracies unless very carefully estimated.

The first of these items is the cost of the gasoline consumed by the truck dur-

The Commercial Vehicle—Truck Cost System			
Year		Month ending <u>June 1</u> 19 <u>20</u>	
Make of truck		<u>Service</u> Gasoline <u>Electric</u>	
MONTHLY COST SUMMARY SHEETS U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline	<u>1289</u> gals.	@ <u>25¢</u>	\$ <u>322.25</u>
Current	_____ kw-h	@ _____	_____
Oil	<u>232</u> qts.	@ <u>15¢</u>	<u>34.80</u>
Grease	_____ lbs.	@ _____	_____
Kerosene	_____ gals.	@ _____	_____
Waste	_____ lbs.	@ _____	_____
Dist. Water	_____ gals.	@ _____	_____
Driver	<u>290</u> days	@ <u>\$5</u>	<u>1450.00</u>
Helper	_____ days	@ _____	_____
Mechanic	_____ hrs.	@ _____	_____
<b>A—Total Operating Charges</b>			\$ <u>1807.05</u>
<b>Maintenance Charges</b>			
*Tires	<u>11,600</u> miles	@ <u>\$.0169</u>	\$ <u>196.04</u>
Repairs	<u>11,600</u> miles	@ <u>\$.0172</u>	<u>200.00</u>
Overhauling, painting, etc.	<u>Included in Repairs</u>		_____
Spare vehicle rental	<u>None</u>		_____
Garage rental (pro rata)	<u>@ \$10 per month</u>		<u>120.00</u>
<b>B—Total maintenance charges</b>			\$ <u>516.04</u>
<b>Fixed Charges</b>			
Insurance, fire	@ _____	per year	\$ _____
Liability	@ <u>\$85</u>	per year	<u>85.00</u>
Collision	@ _____	per year	_____
Interest	@ <u>6</u> % (On Item 1)		<u>60.00</u>
Depreciation on chassis	@ <u>71600 miles @</u>		_____
Depreciation on body	@ <u>\$.0358 per mile</u>		<u>415.28</u>
Depreciation on equipment	@ <u>See above</u>		_____
*Depreciation on tires	@ <u>Taxes \$5. License \$20</u>		<u>25.00</u>
Total taxes and licenses			_____
<b>C—Total fixed charges</b>			\$ <u>621.28</u>
			<u>2908.37</u>

\*Note: Omit one of these.

*4 year basis*

The above sample sheet shows the various charge items divided under three heads: Operating Charges, Maintenance Charges and Fixed Charges. This division is arbitrary and is simply for convenience of classification. But all charges are equally applicable and none must be omitted. The charges shown cover one year.



ing the period which is taken as a unit in estimating costs. This unit may be a day, a week, a month or a year. For the sake of simplicity, a month will be taken as a unit in this article.

In estimating the cost of gasoline the first essential is a system which will accurately record the amount of gasoline used. The simplest way to handle this is to install a pad, or booklet, on the sheets of which may be recorded in triplicate, the amount of gasoline drawn by each driver on each occasion. The records should include the name of the driver, the number of the truck, the amount of gasoline drawn and the date. One copy of this record should be retained by the man issuing the gasoline, one copy should go to the ledger clerk to be entered as a daily charge and one copy should go to the cost keeping clerk for entry against the truck drawing the gasoline.

The second item is the amount of oil used and the cost of it. This should be handled in the same way as the gasoline.

But it should be remembered in keeping these records that the amount of gasoline drawn should correspond with the amount of mileage gained from that gasoline. It is a comparatively simple matter for a dishonest driver to retail gasoline from his tank and if he is allowed to draw gasoline without check this particular cost item may soar far above what it should be.

### Driver, Rent and Taxes

Others of the more easily estimated cost items are drivers' wages, garage rent and taxes and licenses.

The drivers' wages are comparatively simple to estimate. It is simply necessary to charge the truck with the wages paid to the driver during the month on

which costs are being estimated. There is one point here, however, which should not be forgotten, in estimating drivers' wages. If the driver works his entire working time on a particular truck, his entire salary should be charged to that truck. But if part of his working time is taken up in warehouse work, or other work not connected with the truck, an equivalent percentage of his salary should be charged away from the truck to the department involved.

If mechanics are maintained for repair work on the trucks the charge against the truck may be made on a time basis. That is, if a mechanic works on a truck 16 hours during the month and receives 50 cents an hour the truck will be charged with \$8 mechanics' time. On the other hand the wages paid mechanics may be lumped together and divided equally between the trucks in the fleet. The first system is preferable as it permits of a closer check on the efficiency of the individual truck. But in any case, if the mechanics are maintained solely for the trucks, the entire cost of those mechanics must be charged off against the trucks. Conversely, if the mechanics have other work besides the truck repair, only a proper proportion of their wages should be charged against the trucks.

There are two ways of estimating and charging garage rent also. Either the entire rental of the garage should be divided equally among the trucks or the entire rent should be apportioned according to the size of the trucks and the space they occupy. But the entire rent must be taken care of. If the building is owned the same thing applies, the amount designated as rent being in this case the cost of upkeep of the building, the taxes, and the interest on the investment in the building.

Taxes and licenses on the trucks themselves should of course be charged direct to the truck involved.

### Tires, Repairs, Etc.

The next cost item is that of tires. An accurate estimate of this item involves an odometer on the truck itself. With this instrument it is easy to estimate the amount of mileage covered by the truck during the month. The operator should divide the total cost of the tires by the guaranteed mileage. This will give him the cost per mile on the tires. Multiplying this cost per mile by the mileage covered will then give him the tire cost for the period.

The next item includes repairs, overhauling and painting. A certain amount of guess work cannot be avoided in estimating this item. To get anything approaching a fair average charge for repairs, it is necessary to estimate the amount of money the truck will cost during its entire life for these items, and divide this amount by the length of time the truck is expected to last in operation. This is to avoid an excessively high repair cost at a later period in the life of the truck.

For the first year there will probably be little or no cost for repairs. The

## The Commercial Vehicle—Truck Cost System

Number of Truck 13-E

Capacity in lbs 2000

Chassis No. \_\_\_\_\_

MONTHLY COST SUMMARY SHEETS

U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK

### Investment

Cost of chassis, less tires

*Second Hand*

\$ 1 430 70

Cost of body

Cost of equipment

Cost of tires

*Second Hand*

169 30

1—Total cost, complete

\$ 1 600 00

### Performance Record

2 Days operated

290

3 Days idle

75

4 Days maintained (Item 2—Item 3)

365

5—Total hours operated

2320

6—Total miles covered

11,600

7—Total trips made

290

8—Total ~~commercial~~ packages ~~carried~~

58,000

### Performance Averages

9 Average miles per day maintained (Item 6—Item 4)

31.78

10—Average miles per day operated (Item 6—Item 2)

40

11—Average miles per trip (Item 6—Item 7)

40

12—Average ~~commercial~~ packages per trip (Item 8—Item 7)

200

13—Average commercial ~~package~~ miles ~~carried~~ per trip

(Item 11 x Item 12)  
2

4000

### Recapitulation

14—Total expenses for year (Sum of Items A, B and C)

\$ 2908.37

15—Cost per day operated (Item 14—Item 2)

10.03

16—Cost per day maintained (Item 14—Item 4)

7.97

17—Cost per mile operated (Item 14—Item 6)

.2507

18—Total commercial ~~package~~ miles ~~carried~~ (Item 7 x Item 13)

116,000

19—Cost per commercial ~~package~~ mile ~~carried~~ (Item 14—Item 18)

\$ .0025

Once the total charges are estimated they are carried to this second page of the record (Item 14). Here, too, are shown the performance records and from these and the total charges it is a simple matter to work out the cost per day, per mile, per ton, etc. But these records are invaluable to the operator in many ways



second year the repairs including spare parts, etc., may cost \$100, the third year \$200, the fourth year \$400 and so forth. The commonest practice in this regard is to take an arbitrary repair, painting and overhaul cost per mile and charge it from the beginning. The mileage basis is better than a time basis because increased mileage means increased repair costs.

### Insurance, Interest, Etc.

The manner in which insurance is charged against the trucks will depend upon the type of insurance carried. If a blanket insurance policy on all the trucks is carried, the cost of the premium for the year should be divided by twelve for the month and then charged off equally against the different trucks. If separate policies are carried, the premiums will of course be charged to the individual vehicles involved.

Whether or not interest on the investment in the trucks should be charged against the trucks is a moot point. It may be considered that the profit earned by the trucks is the interest on the investment and that if 6, 7 or 8 per cent is deducted from that profit the remaining net profit is inaccurate and misleading.

On the other hand, it might be considered that profit which included interest on the investment was not really a net profit. Perhaps the best way to estimate this item is as follows: If an operator has invested his own money in his trucks, the profit that operator makes in the trucks is his interest on the investment and no interest should be previously deducted from those profits. On the other hand, if the operator has borrowed the money to buy the trucks he should deduct the interest he pays on the loan before estimating the net profit earned by his trucks.

### How to Charge Interest

In charging interest, however, it must be remembered that the yearly depreciation item is gradually repaying the original investment. Therefore, the interest will decrease as the investment decreases.

Interest should be charged on this basis. The first year the investment will be, say \$5,000. The interest at 6 per cent will then be \$300. The second year, the investment will have been depreciated 20 per cent. It will be \$4,000 and the interest will be \$240. The third year the investment will be \$3,000 and the interest \$180. The fourth year there will be \$2,000 and \$120 respectively and the fifth year the investment will be \$1,000 and the interest \$60. These interest items should be added together, giving a total of \$900 in interest charges for the five years. Dividing this amount by 5 gives a yearly interest charge of \$180, or a monthly interest charge against the truck of \$15. Figuring on the other, and incorrect, basis, the yearly interest charge would be \$300 and the monthly interest charge would be \$25. This last method is incorrect and should not be used.

Finally we come to the item of depreciation.

This item is also somewhat difficult to estimate. Any kind of an accurate estimate involves a previous knowledge of the length of time the truck will last or the mileage it may be expected to cover during its life. The mileage estimate is probably the more accurate, as the mileage covered by the truck will depend largely upon the class of haulage in which it is engaged, while the time it lasts will not be so much affected.

To estimate this item the operator should know the value of his vehicle including all equipment. He should then deduct the cost of the tires, as depreciation on these is charged elsewhere. Knowing the mileage which the truck may be expected to cover it is now simple to estimate the depreciation. Sup-

three different sources mentioned above.

### What Cost Records Show

Once the operator has before him the final figure, including all items, showing what it cost him to operate his truck during the month, he can then obtain a mass of other useful information.

On the preceding pages are shown sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. The first of these sheets is designed for the entry of the various items already described. The second sheet contains a summary of the performance record of the truck and finally a recapitulation of the information which can be made available by expressing the performance in terms of cost.

When the operator has concluded the estimation of the above items it is obvious that he has a record which will be invaluable to him in estimating the amount which he should charge for the services of his vehicle. Because, if he knows exactly how much it costs him to operate a truck per mile, and to haul a ton, it is comparatively simple for him to add a certain percentage for his profit and charge for the services of his vehicle accordingly.

### Other Advantages Also

But there are other and equally important advantages in keeping accurate cost records. A little consideration will make these evident at once. For example, if the gasoline costs \$50 one month and \$100 the next month and the mileage covered is about the same for each month it is obvious that there is a leak somewhere, that the operator is losing money unnecessarily, and that it behooves him to catch and stop the leak.

Similarly if the tons hauled and the mileage covered are low for any month, the cost per ton and per mile will be high. This means that the truck is not working to full capacity. Investigation may disclose carelessness, inefficiency or laziness somewhere. By correcting this the operator can increase his profits.

One word more: If the trucks are a secondary consideration in the business, that is, if the trucks are merely required to deliver a product or products and the manufacture or distribution of that product or products is the principal activity of the business, then the major portion of the overhead expense should be charged to the manufacturing or distributing end of the business. Nevertheless, there will be a certain amount of overhead expense chargeable directly to the trucks and this item should not be omitted in estimating the truck costs.

On the other hand in a business such as intercity haulage, moving work, etc., where trucking is a primary consideration, the entire overhead expense must be charged to the trucks and divided among them in estimating the cost. Otherwise the remaining profit will be false and misleading and the operator may think he is making 20 or 25 per cent profit when his profits are only 2 or 3 per cent or he is actually losing money.

### What the System Costs

*The two preceding pages show filled-in sample sheets of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.*

pose the truck less tires is worth \$5,000 and may be expected to run 100,000 miles before it is junked. The depreciation per mile will then be 5000 divided by 100,000 or 5 cents per mile. If the truck runs 500 miles during the month, the depreciation charges for that month will then be 500 multiplied by .05 or \$25.

### How to Keep Records

As already indicated, a certain amount of bookkeeping is necessary to estimate the above items. In the first place it is necessary to obtain a definite daily statement from the driver as to the gasoline he used, the oil he used and the miles he covered. This is usually handled on a driver's daily card which he turns in to the office each night. The back of this card is used as a rule for the driver's report as to the condition of his truck and any parts thereof.

The other cost items can be estimated from the ledger in which the truck records are carried. But in obtaining accurate ledger records on repairs and mechanics' time, it is also necessary for the superintendent of the garage to turn in a daily report to the ledger clerk with a record of the time spent by each of his mechanics in repairs and the distribution of that time among the trucks.

The cost records on each truck should be maintained separately for that truck. But these records are obtained from the



# Being a Success and Then Some—

By  
SINCLAIR GLUCK

WHEN old Silas Gunther, president of the town's largest commercial house, was most annoyed, he made it a point with himself to be most genial, to counteract any possible injustice he might do when in such a mood.

That is one reason, perhaps, why his title of Old Hammerhead, bestowed upon him by his employes, carried a good deal of affection and respect with it.

He was annoyed this morning—annoyed and a little impatient—because he had the best interests of his employes at heart always and wrong-headedness or stupidity on their part hurt him as much on their account as on that of the business.

The cause of the trouble sat in the chair beside Old Hammerhead's desk with a curious expression, half shy, half sullen, on his young face. Burton was a young mechanic, just graduated from high school, with a very fair education, a good deal of natural ability in his chosen line and a very good opinion of himself. Old Hammerhead had been watching him of late and had finally sent for him for a talk.

"Burton," said the old man, at last, "I understand you had some little difference of opinion with Ross over a question of making certain repairs. Tell me about it, will you? Understand—Ross did not mention this to me. I have my own ways of knowing what goes on in the organization. Not that this has any particular importance."

The old man smiled genially. "I take a real interest in all you fellows, you know. And I like to keep in touch with your work. We all get up against snags in the stream sometimes, and when that happens to my people I like to think that I can sometimes help to pull them clear. Do you see?"

Burton looked down and was silent for a moment. After all, what was there to tell?

"Come, tell me about it," the old man prompted, pleasantly.

The young fellow cleared his throat. "Well, sir," he began, uneasily, "you see, Ross put in this—sort of—unit repair system—repairing different parts of the trucks in different departments. And he put me in the rear axle department.

"That was all right, sir, and I got on fine with the work—kept pretty well up to schedule and got the trucks out on time and all. Then, yesterday, he comes to me, when I'm just finishing putting my last axle together, and wants me to repair a mag." The young fellow broke off. Somehow, now that he came to tell it, Ross's request did not seem so unreasonable after all.

"I see. Go on," Old Hammerhead nodded.

Burton twisted in his chair. "Well, sir, I—I'd been working pretty hard—and—and I'd studied upon axle repairs and all—he put me on those, you see—and—I didn't like being taken off that and put on something else like that. That was all."

Old Hammerhead nodded again. "I see," he answered, quietly. But as a matter of fact, he did not see—very clearly. It was difficult for him to get the point of view that had led the young fellow to get sore over what amounted to a compliment to his all-round skill—to say nothing of the opportunity to broaden his experience and increase his value to the organization.

The old man glanced around the room in search of inspiration. How could he show him—without making too much of the business? Then suddenly his eye lighted on the telephone on the desk before him and he smiled slightly.

"Burton," he said, "look at that telephone! Does it say anything to you? Do you see any expression in it?"

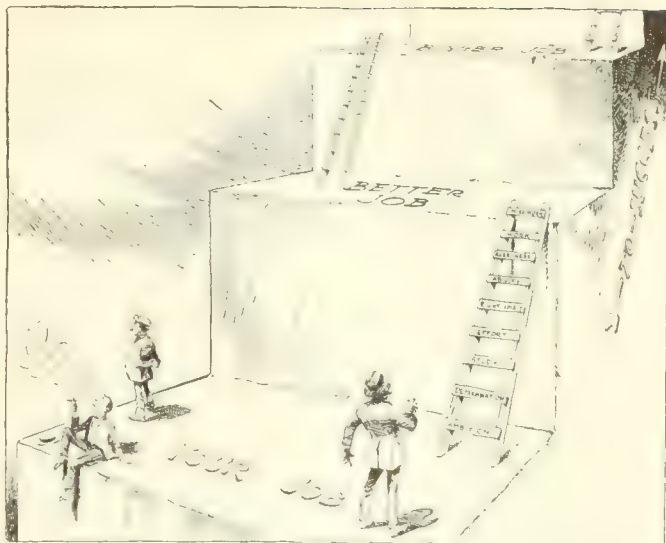
The young man grinned uncertainly. "Don't believe I understand you, sir."

"Well," laughed the president, "I'll tell you. It stands there quite still, with the transmitter pointed at us—waiting. And to me it looks sort of patient and eager at the same time. Do you get what I mean?"

Burton stared at the telephone, wondering. Then his face lighted up a little.

"Yes, sir, I believe I do. It does look sort of—eager!"

Old Hammerhead smiled. "I'm glad to see you have imagination," he answered. "But now let's think about that telephone a little. It's meant for just one thing. It's capable of just one thing—to transmit the human voice. And to me it seems to be waiting patiently and



eagerly to do that one thing as soon—and as well—and as often as it possibly can. Don't you think so?"

Burton nodded, smiling. "Yes, sir, it does sort of look like that."

"In a way, it's a pretty good example, Burton," Old Hammerhead went on, "but don't forget that it's good for only one thing, so it can't get very far in life, beyond, maybe, being the best telephone for miles around."

"But—" Here the old man leaned forward in his chair, "you're good for lots of things, Burton. And the more things you fit yourself to do, the farther and faster you'll travel in life."

"If you've learned one thing well, why be eager and patient to do that thing whenever you can. So far the telephone is a good example. But don't stop there, Burton. Be just as eager to do the next thing that you get a chance at."

"Most people are only too glad to get a chance at something new, Burton, in addition to their other work which they have learned. They know that breadth of experience increases their ultimate value in the world. And if new things don't come their way, and they have to keep plugging away at the old things that they know, why they do those as well as they possibly can and wait eagerly and patiently for the chance to do new things, too."

"But you haven't got that heartbreaking wait ahead of you. We'll push you here just as fast as you can go. We want you to get on. We want you to succeed. For your success means our success in the last analysis. But when we try to sick you onto something new—to give you a chance to broaden yourself—why, you kick. Eh, Burton?"

The young man got up. "I was a fool," he answered simply. "I see that now."

Old Hammerhead smiled. "Oh, not as bad as that, Burton. But remember what Abe Lincoln said, when he was young and uneducated and unknown. 'I will study and get ready,' he wrote, 'and maybe my chance will come!' That's a better point of view for you, Burton, don't you think so?"

"Yes, sir, I do!" the young fellow answered, simply.

# The Better Way

## To Save Time in Truck Repair and Maintenance

### No. 557—Spreader for Inspection and Repair of Tires

THE tool shown in the accompanying illustration will be found of especial help in spreading the beads of a tire and holding them open while patching, cementing or inserting a section of fabric. This is a quick acting tool which will open the beads of the heaviest tire while an inspection of the inner surface of the fabric is being made.

The tool can be made from  $\frac{1}{8}$ -in. sheet steel, fastening clip made from round wire, and a rivet through these two tongue-like grips.

The edges which engage the bead or the tire are bent, as shown in the sketch, to give a flat face where they fit over the beads. To use tool, one handle is raised to bring the jaws together; it is then placed in the tire and the handles brought together. The fastener is then slipped into position and locks in the notched handle. The mechanic will find this small compact spreader a time and temper saver.—F. TODD, Chicago.

### No. 558—Valve Lifter for Ford Engine

FLEET mechanics are often delayed in their valve grinding work on Fords because of the fact that they are without a valve lifter. The simple device shown in the accompanying illustration will serve the purpose satisfactorily.

This is made of a piece of flat iron or steel,  $3\frac{1}{2}$  in. long,  $\frac{3}{4}$  in. wide and  $\frac{1}{4}$  in. thick. This piece is then bent in a half circle at one end, as shown in the sketch.

To use this valve lifter, turn the engine over until the valve is wide open. Then place the valve lifter between the valve washer and the engine base, turn the engine until the valve is closed, pull out the valve pin. After these operations, the valve is ready to be ground. After this operation has been completed, replace the pin, turn over the engine until the valve is open and remove the lifter. Repeat the same operations until all of the valves have been ground.—F. W. SHEETZ, Russ Bros. Ice Cream Co., Harrisburg, Pa.

### 559—Shop-Made Vise or Tool Handle

THE small tool shown in the accompanying illustration is a handy feature for the tool kit of any mechanic,

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

and will serve to do the many small filing and fitting jobs where a pin, screw, dowel, key and other piece is to be held in place while filing and grinding. As a handle for the file, stub section of a hacksaw blade or chisel, this handle will stand rough treatment, hammering or driving without splintering up as would a wooden one. One of these handy aids can be made up in  $\frac{1}{2}$  hr. of spare time from 12-in. length of  $\frac{1}{4}$ -in. by  $\frac{1}{2}$ -in. bar stock.

File or chisel two V-slots in the ends of the bar, double over at the center, grind off the edges, run a die over the end cutting a thread for a  $\frac{1}{2}$ -in. nut, and the tool is complete. For a larger tool a correspondingly larger section of stock is used and a larger nut is threaded over the jaws.—J. WELLER, Bloomfield, N. J.

### No. 560—Preventing Chips Falling with Magnet

IN drilling out broken off studs or other holes which may be necessary about an engine or transmission case, it is very important to keep the chips from falling inside the case. An old magneto magnet placed by the side of the drill

will collect the cuttings and may be carried away. On iron casings the magnet should be kept from touching the case by a piece of fiber or pasteboard.—NATHAN S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

### No. 561—Holding Heat in a Light Solder Iron

WHEN a solder iron is too light and therefore loses the heat too quickly, the trouble can easily be remedied with wire which is wound around it to make it sufficiently heavy.—ALBERG STAHL, New York City.

### No. 562—Replacing Flywheel Rim Gear Teeth

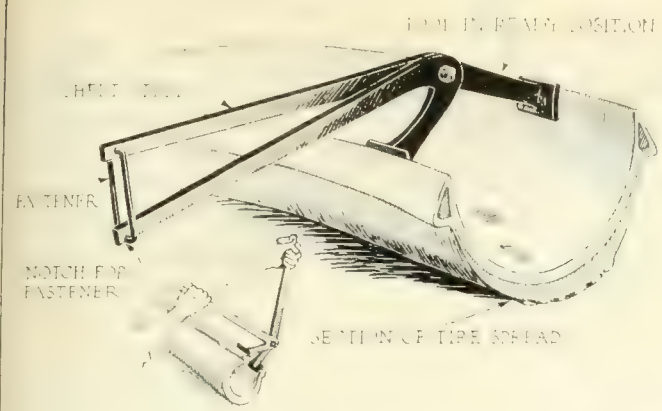
THE type of repair shown below is more or less familiar to most mechanics; however, the shouldered stud as will be noted on closer inspection is a deviation which makes a successful repair where the usual straight stud would fail. This repair for several teeth in the rim of the flywheel for the starting gear is entirely practical and dependable. The cost of this repair is far less than that of replacing the wheel.

The head of the stud is made of a large diameter, using cold rolled bar, nearly the width of the adjacent teeth. The flywheel is drilled at the center of the broken tooth and tapped out for a  $\frac{3}{8}$ -in. stud. The circular bar is then cut down to this diameter and threaded. The flywheel is counterbored to the outside diameter of the bar, the section is screwed in and locked by a driven fitted dowel pin, to prevent its shifting position. The tooth shape is formed by cutting off the surplus metal with the hacksaw, and finishing with a file to a small template made of tin to the shape of the adjacent teeth.—S. DRAKE, Norristown, Pa.

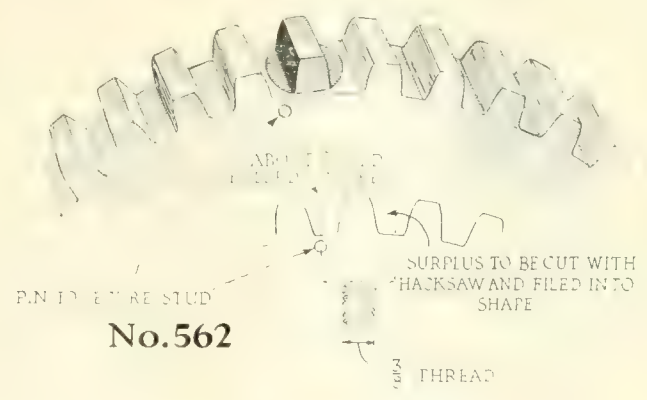
### No. 563—Liquid Resin for Bending Copper Pipe

THE problem of bending metal tubing is one that comes up quite frequently in the truck repairshop. In the case of copper tubing, the actual bending operation is not so difficult, the main desire being accuracy. If an exact job is desired, fill the pipe with liquid resin or pitch. When cold the pipe can be bent in any shape. The resin is then removed by heating.—ALBERT STAHL, New York City.

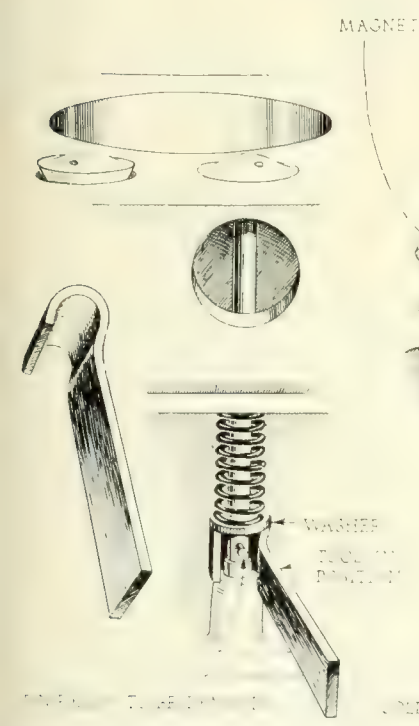




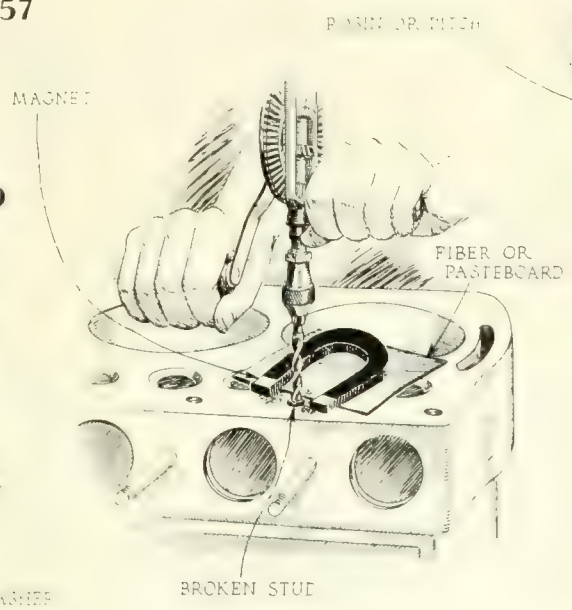
No. 557



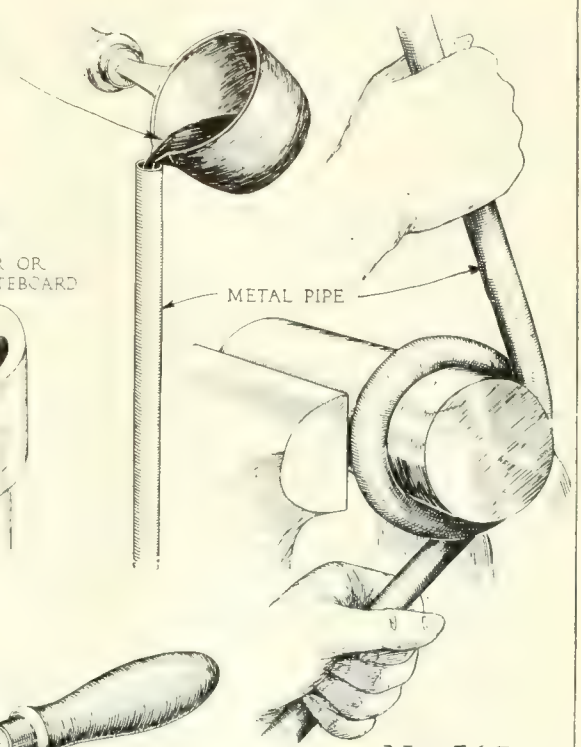
No. 562



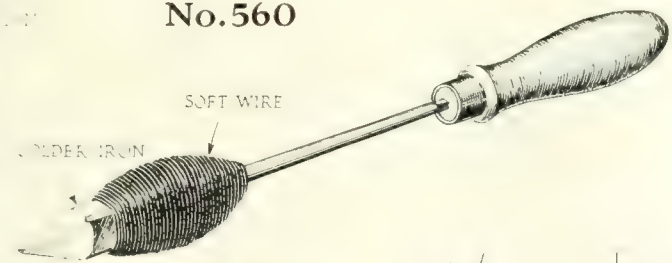
No. 558



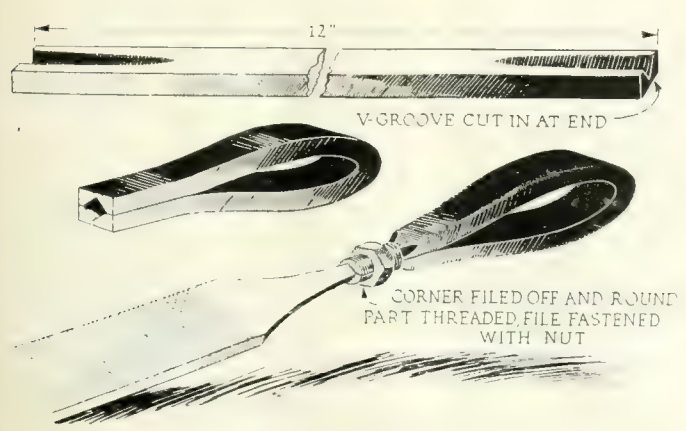
No. 560



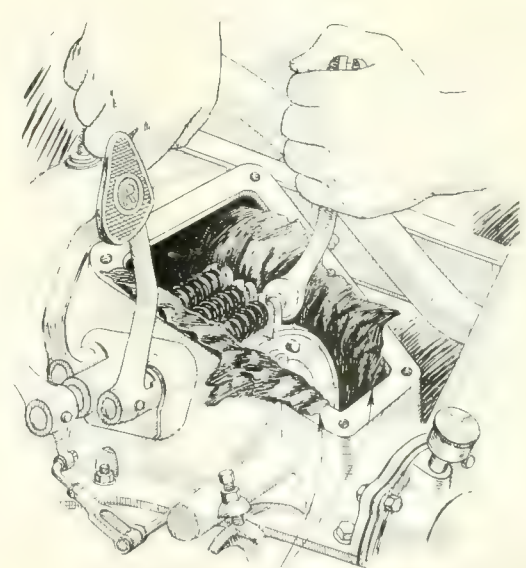
No. 563



No. 561



No. 559



No. 564

### No. 564—Rags Stop Wrenches from Falling in Gearset

**H**OW many times have you been delayed by dropping a wrench or nut in your Ford transmission case? Frequently it is necessary to tighten the brake and reverse bands while on the road, usually during a rush delivery. After removing the transmission case cover, you no doubt have collected by that time enough oil on your hands to make handling of a wrench quite difficult. In your hurry to make the adjustment, the wrench slips and falls down into the case.

If you had tucked a rag around the gears, as shown in the accompanying sketch, it would have been impossible for the wrench to have fallen down into the case. This is a simple method and may be used in other places where there is a possibility of this happening.—N. S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

### No. 565—A Simple Lathe Center Lubricator

**T**HE oil feeder shown in the accompanying illustration, while a simple, easily made device, will relieve the machinist from the constant oiling of the lathe tail stock center when taking long cuts. It is made from a piece of tin or sheet metal bent as shown and soldered to an old oil can spout or a small cone.

With the job in place in the machine the oiler is hung on the center as shown in sketch. The oil with which the wad of waste in spout or cone is saturated feeds by gravity and, dripping down through the spout, is led by it to the center point.—A. HELDRIGEL, Newark, N. J.

### No. 566—Tool for Refacing Valve Seats

**T**HIS tool is a time and labor saving device and it is easily made and installed. It may be applied to all makes of engines.

As the illustration shows, this is a cutting tool which is the same size and shape angle as the face of the valve seat (30 deg. from the horizontal).

In the valve guide hole is placed a bearing which is fitted according to variations in the valve stem used. Thus it is possible to take care of the cutting of any size of seat.

An old valve of tungsten steel will serve the purpose of a cutter and when used the upper spindle is fixed to the cutter, the latter being integral with the stem that goes through the exchangeable bearing shown in the sketch.

An ordinary valve spring holds the cutter tight against the seat, tension being accomplished by the pressure of the spring against the ball bearing at the bottom. The ball bearing facilitates the rotary motion of the screw driver during the cutting operation.

If the cutter is revolved with this screw driver a few times, the result will be a clean planed seat very difficult to

attain with ordinary emery.—ROSSI SEVERINO, Torino, Italy.

### No. 567—A Place for the Tire Gage

**T**HE garage man's great difficulty in servicing tires is keeping an air gage where it can be had instantly. A good place to put it is on the end of the air hose.

To do this, the following items are needed: An air gage, a cross length of tire chain, a short piece of wire, a short piece of  $\frac{3}{4}$ -in. hose, a small amount of tape, and the means to do a little soldering.

With these items laid out, proceed as follows: Take the air gage apart by unscrewing the base and taking out the rubber case and retaining spring. Keep the parts in order, so they can be properly replaced. Now straighten hooks of the chain and file one end half flat and bend the other end into a loop for attachment to the air hose. Solder the flat end of the chain to the air gage case, taking care to make a neat joint, as the finished job will be covered with hose, and therefore it must not be too large.

After the air gage is reassembled, loop the chain around the air hose about 8 in. from the end and tie securely with the wire. Wrap the tie-up with tape to prevent any tearing or hurting of the hands. Cut a piece of the  $\frac{3}{4}$ -in. hose  $\frac{1}{8}$ -in. shorter than the gage and slip it over the air gage, cutting a section out where the chain is soldered on. This will protect the gage from wear and abuse due to handling of the air hose. This method of handling the gage will be found of value in any size of garage as it saves time, gages and tires.—W. FATOUT, Dover, Del.

### No. 568—Altering a Jack for Quick Lifting

**T**HE addition of a long handle and two wheels to an ordinary jack makes a fixture of rapid serviceableness for use in the truck shop. This fixture is also serviceable for the fleet owner when he wishes to jack up the wheels for periodic inspection.

The alterations consist of a 5-ft. section of wrought iron pipe flattened at one end and riveted to a plate of sheet steel about 6 by 8 in. The base of the jack is bolted to this plate or riveted to make it more secure. Two small steel wheels are secured to the plate by means of an attached bar as is shown.

To lift a truck the jack is simply pushed under the axle in a tilted position and the lever lowered down. This lifts the truck and it remains lifted until the jack is removed in a manner the reverse of lifting. This method avoids crawling under the truck to place the jack in position and working the handle up and down from this awkward position. The usual ratchet lift is set at any desired height and is not changed except where trucks with unusually high or low axles are to be worked upon.—G. BATES, Summit, N. J.

### No. 569—Making a Brazed Repair of a Crack

**A** BRAZED repair of a cracked part such as a cylinder is not difficult when done in the following manner: It is not necessary to tear the engine down as is required for welding and pre-heating in the furnace previous to this welding.

This consists in placing a small brass wire at the bottom of the seam and fusing the spelter around this. The fissure is first drilled out at the extreme ends, tapped and fitted with brass or copper studs.

The crack is chiseled out to a depth of  $\frac{1}{4}$  in. for the wire and spelter and filed bright for  $\frac{1}{2}$  in. either side of the crack. The spelter consisting of borax and brass filings, is heaped up above the crack and a blow torch is applied until the spelter fuses and runs, brazing the brass wire solidly into the fissure. If available, two blow torches should be applied, one at either side of the crack to localize the heating and give a much hotter flame.—H. JOHNSON, Bridgeport, Conn.

### No. 570—Hand Hoist for Barrels

**T**HE dumping of the contents of a 50-gal. oil barrel into the measuring tank drum is not the simplest task; however, with the hoisting apparatus shown, this can be accomplished single handed.

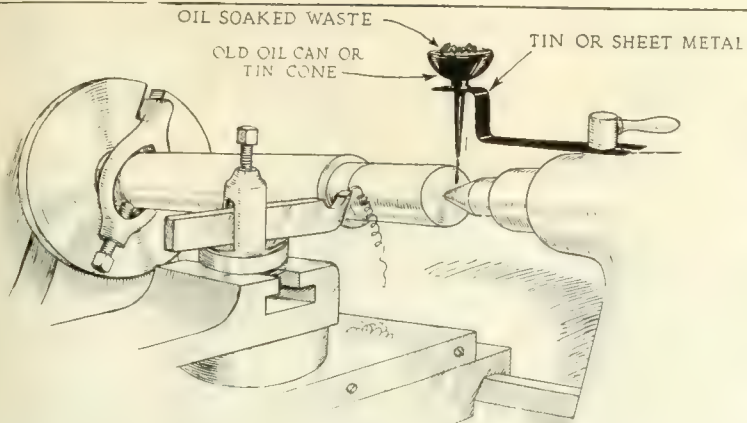
This simple device consists of a single lever and two runners which permit of lifting and rolling the barrel into position so that the bung is directly over the filling opening in the measuring tank. The lever is made from two pieces of planking joined at the end with two small rollers at the opposite end.

The runners consist of two pieces of plank planed parallel and hinged to the lever. The ends of the runners are provided with blocks to hook to the edge of the measuring tank. A 12 or 15-in. space between the runners is sufficient width for balancing either steel or wooden oil barrels.—A. VAN PYLE, Jacksonville, Fla.

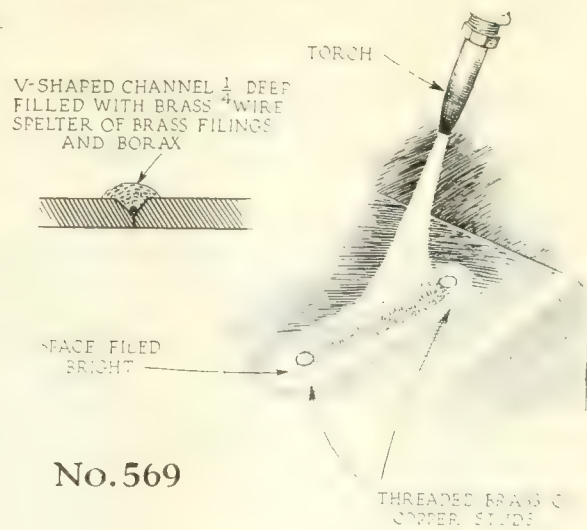
### No. 571—Running-in an Engine

**T**HE accompanying illustration shows a good idea for running-in a reassembled truck engine. The parts are a hub-puller, driveshaft, universal joint and strap iron. The service truck is jacked up and the hub-puller on one end of the shaft attached to a wheel hub. The other wheel is tied stationary. The other end of the shaft, by a strap iron clamp, is fixed to the crank of the engine to be run-in. The service truck engine is started and after the engine to be run-in has been turned over a few times, it is shifted into high. It is not necessary to demount the engine to have this running-in stand available.—R. WOOD, Philadelphia.

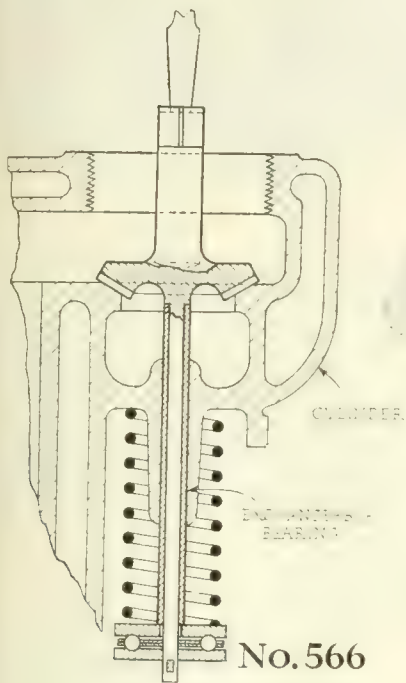




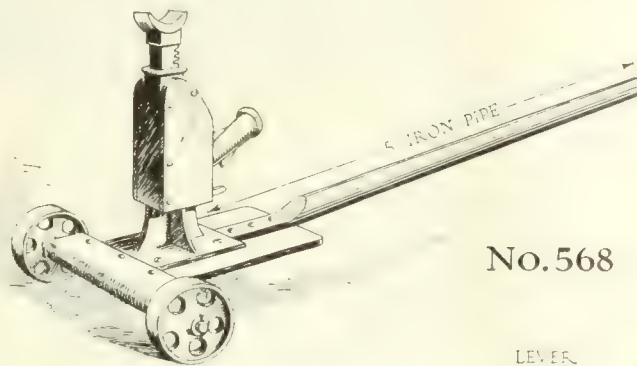
No.565



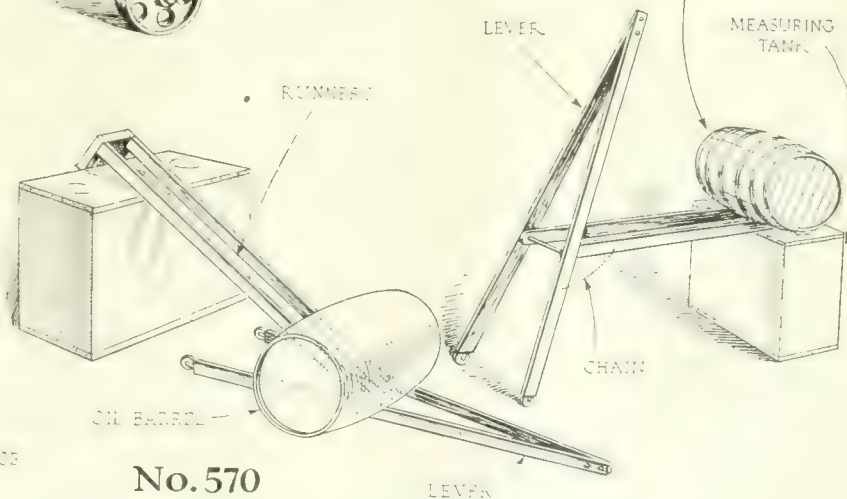
No.569



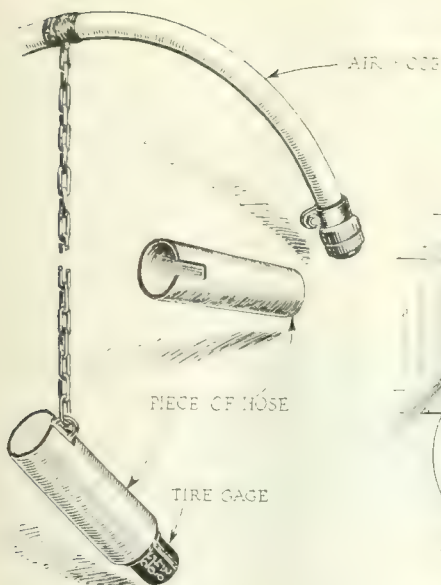
No.566



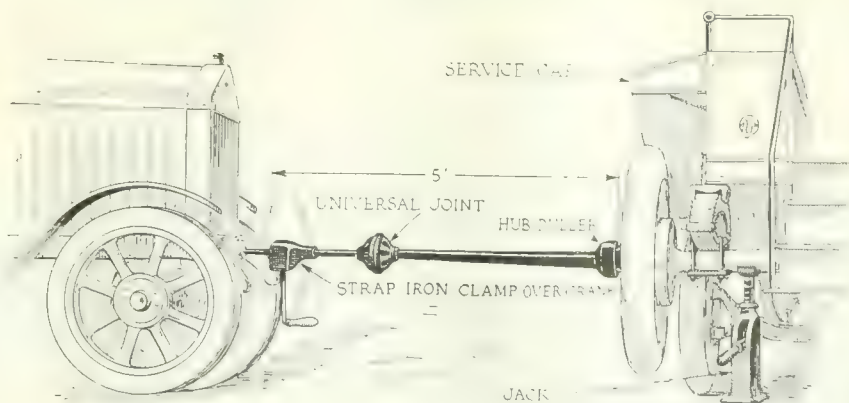
No.568



No.570



No.567



No.571

## Buyer's Department of The Commercial Vehicle

### Ruggles Enters the Field With 1-Ton Truck

**Especially Adapted for All Around Town and  
Country Use—Sold Completely Equipped**

#### RUGGLES SPECIFICATIONS

Capacity, tons	1
Wheelbase, in.	121
Tires, front	34 x 5
Tires, rear	34 x 5
Gear ratio in high gear	5.55 to 1

**T**HE Ruggles Motor Truck Co., Saginaw, Mich., founded by Frank W. Ruggles, has entered the road transportation field with a 1-tonner especially adapted for all round town and country use. It is an assembled job, the units consisting of the following: Continental four—Model N block engine with detachable L-head; Stromberg carbureter; Fuller gearset; Columbia rear axle; and Jacox steering gear.

The truck is sold complete with an express body with canopy top, adjustable ventilating, rain-vision windshield, starting and lighting system, horn, extra rim, tire carrier, Alemite chassis lubrication, complete set of tools including a tire pump and jack.

The three-point mounting of the engine is substantially built for continuous business service. Engine lubrication is taken care of by a force feed system through a plunger oil pump to the main bearings and timing gears. The cylinders are supplied with lubricant by the constant level splash system. In con-

nection with the powerplant is the 13-in. multiple-disk clutch completely enclosed in a bell housing. The gearset is a unit with the engine and is of the selective type, three speeds forward. Control is in the center on a ball-and-socket joint.

Included in the equipment is a battery generator system of ignition with manual advance; the ignition generator furnishes current to the storage battery for the electric lights and the starting device.

The engine is cooled by the thermosiphon system of water circulation through the cylinder jackets and through the Ruggles type of cellular core radiator, with radiation assisted by the belt-driven fan.

The driveshaft\* extends through two enclosed universal joints and the tubular propeller shaft. The rear axle is of the three-quarter floating type with roller bearings. The front axle is of drop-forged I-beam construction with integral yokes and nickel steel spindles with taper roller bearings.

The frame is of pressed steel, channel section, the length overall being 184 in. The width is 34 in. The frame is strongly reinforced with cross braces and gusset plates and is suspended on semi-elliptic springs having seven-leaves on the front and ten on the rear.



Rear view of Ruggles 1-tonner

Both brakes operate on the rear wheels, the foot brakes being external and the emergency internal.

The steering gear is irreversible and adjustable. Steering is on the left. The throttle, spark lever and horn button are on the steering wheel.

The fuel tank, tool compartment and battery are under the driver's seat. The driver's comfort has not been overlooked, extra leather upholstery being used. Ample leg and arm room is also available.

#### Apex 1-Ton Speed-E-Livery Model in Production

##### APEX SPECIFICATIONS

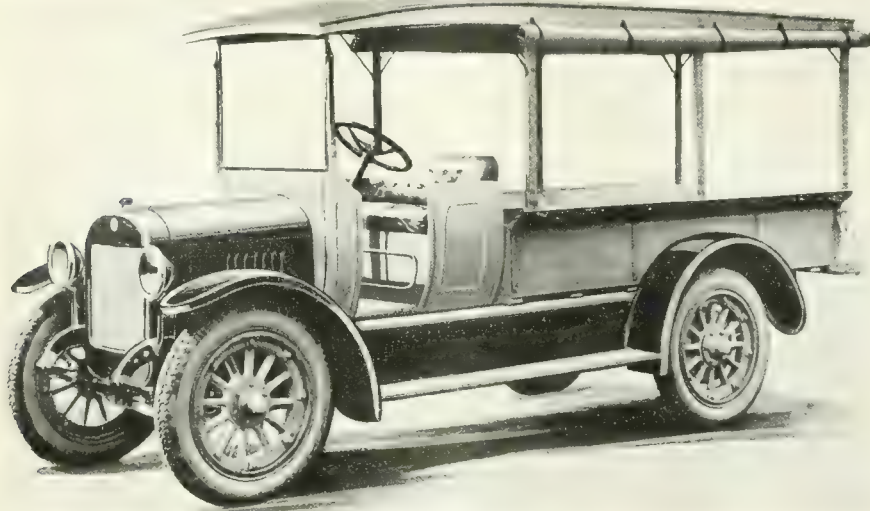
Capacity, tons	1
Price	\$1,450
Wheelbase, in.	120
Tires, front	33 x 5
Tires, rear	33 x 5
Bore, in.	3.4
Stroke, in.	4.5
N. A. C. C. hp	19
Final drive	Int. Gear or Worm

**T**HE Apex 1-ton Speed-E-Livery model made by the Hamilton Motors Co. Grand Haven, Mich., sells complete with body for \$1,450. Equipment includes an electric horn, starting and lighting, pneumatic tires, tool kit, jack, wheel puller, oil can, and the Alemite high pressure grease cup system.

The body has a 9-ft. length. The frame width is 35½ in. and the length of the frame in back of the driver's seat is 99 in. The overall width of the axles is 72 in.

The truck is assembled with well known units, including a Lycoming KB four-cylinder block engine; Torbensen or Timken rear axles; Stromberg carbureter; Auto-Lite generator, distributor, and starter; Munsey gearset and Borg & Beck clutch; Blood Brothers drive shaft and universal joints; and Lavine steering gear.

The valves in the powerplant are lo-



The new Ruggles truck is completely equipped and includes an express body with canopy top



# Buyer's Department of The Commercial Vehicle



The Apex 1-tonner takes a 9-ft. body

ated two in a cell on the right hand side. They have a diameter of 1½ in., being fully enclosed and running under a constant spray of oil. They are easily accessible by removing the cylinder head and side plate. The exhaust and intake valves are interchangeable.

The connecting rods are drop forged from .40-.50 carbon steel, double heat-treated, I-beam section. The upper end of the rod is bushed with phosphor bronze. The lower end is split and fitted with an adjustable die casting bearing.

The size of the lower bearing is 2 by 2¼ in.; the upper is ¾ by 1-9/16 in. The crankshaft is supported by a bronze backed babbitted bearing. The camshaft and cams are forged integrally, the shaft being supported on three bearings. Lubrication is by the constant level, circulating splash system. The oil is circulated by a plunger pump, mounted inside the oil pan and driven by an eccentric on the camshaft.

Water is circulated by a thermo-syphon system through a ribbon type cellular

radiator mounted in a pressed steel shell.

The carbureter is fed through a Stewart vacuum tank from a 16-gal. tank under the seat.

Drive is on the Hotchkiss principle, torque and driving strains being taken through double wrapped, bronze bushed spring eyes. The three-speed gearset is a unit with the power-plant. The shafts are mounted on annular ball bearings. Drive from the gearset to the rear axle is through a single shaft with two joints.

The front springs have eight leaves whose dimensions are 2 by 36 in. The rear springs have eleven leaves, the dimensions being 2¼ by 52½ in. All four springs are of silico-manganese alloy.

The frame is constructed of 4 in., 5¼ lb. rolled channel, reinforced by gusseted cross members. The frame and frame castings are assembled by hot riveting while clamped in place, insuring alignment of all parts.

The road clearance of the front I-beam axle is 11¼ in. Timken bearings are used throughout. The drag link is of the spring cushioned adjustable tension type. The steering arm is fitted to broached splines which allow adjustments. An 18-in. steering wheel is used.

The brakes operate on the rear wheels and are of the internal-expanding type.

## Eugol 1-Tonner a Newcomer in the Truck Field

### EUGOL SPECIFICATIONS

Capacity, tons	1
Price	\$1,895
Wheelbase, in.	135
Tires, front	34 x 4
Tires, rear	34 x 5
Bore, in.	3.5
Stroke, in.	5.1
N. A. C. C. hp.	21.08
Final drive	Worm

EUGENE GOLDMAN has organized the Eugol Motor Truck Co., with headquarters at Chicago and factory at Kenosha, Wis., through which he will market the Eugol 1-ton, worm-driven speed truck. Mr. Goldman was the organizer and former vice-president and general manager of Master Trucks, Inc.

The company will also specialize in various standard bodies such as express with or without canopy top, platform stake, grain, stock, passenger carryall, motor bus, etc. The present factory capacity is twenty trucks per day. An additional building 385 ft. long

is now under construction which will be used exclusively for body storage and painting.

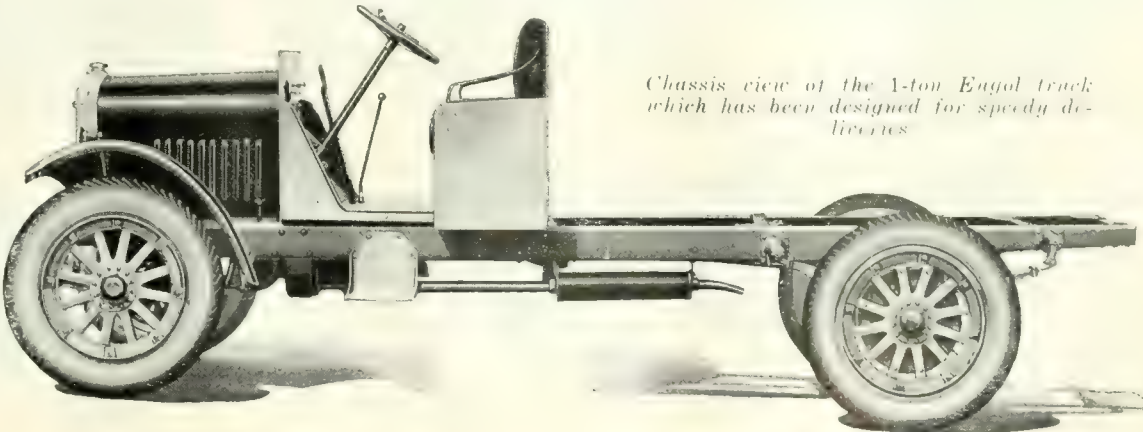
The price given in the above table includes an open cab, cushion, curtains, windshield, starting and lighting, speedometer, jack, set of tools, pneumatic tires, tire pump mounted on gearset, and Alemite chassis lubrication.

The truck is assembled with a Buda M U four-cylinder engine, Westinghouse starting and lighting, Timken front and rear axles, Ross steering gear and Mather springs.

The powerplant has a removable cylinder head and all working parts are en-

closed. The engine is three-point suspended, the rear supports being mounted flexibly on cushion springs. The crankshaft is carried on three bearings. Lubrication is taken care of by a full force self-contained positive pressure feed. Water is circulated by a centrifugal pump through a tubular radiator mounted on coiled springs.

The clutch is of the multiple disk dry-plate type. The three-speed gearset is a unit with the powerplant. The tubular driveshafts are equipped with three dust-proof universal joints, the center joint being mounted on a S. K. F. self-aligning bearing.



Chassis view of the 1-ton Eugol truck which has been designed for speedy deliveries



# Buyer's Department of The Commercial Vehicle

## "Dot" High Pressure Lubricator

THE complete outfit consists of a grease gun, a filler for the gun, nipples to conduct the grease from the gun to the bearings and dust caps for the nipples. In using the gun its nozzle end is placed over the nipple on the grease cup and the gun is then turned a quarter turn to the right. During the first half of this turn the gun is securely clamped to the nipple and the connection is sealed against any amount of grease pressure that may be required for lubricating the bearings. During the second half of the quarter turn to the right the valve in the nozzle is opened, permitting the grease in the gun to be forced through the nipple onto the bearing. The manufacturer is the Carr Fastener Co., Boston.

## Schrader Tire Valve Set

A SMALL kit box which contains every accessory that has to do with a tire valve has been placed on the market by A. Schrader's Son, Brooklyn, N. Y. In addition to a box of valves inside, the kit contains a set of Kwik-On-An-Off dust caps, a set of rim nut bushings, five valve caps, a valve repair tool, a pump connection which permits the testing of the tire inflation without disconnecting the pump from the tire, a wrench for the tightening of the hexagon nuts at the base of the valve stem and a pressure gage. The price is \$5.

## Mayo-Skinner Windshield Cleaner

THIS provides for a perfect vision automatically during the most severe rain, leaving both hands free to control the truck. Just turn a little needle valve on the vacuum motor, installed on the frame of the windshield and the cleaning arm or wiper, starts with the regularity of a pendulum—back and forth. After once started it continues to operate until shut off, fast or slow, as desired. The suction of the engine operates this cleaner. The price is \$12.00. The maker is the Mayo-Skinner Mfg. Co., Chicago.

## Morand Demountable Cushion Wheel

THIS is interchangeable with and replaces any pneumatic truck tire without wheel change. It fits any standard S. A. E. pneumatic center. A cushion of live rubber is bolted top and bottom between steel channels. In action, this cushion provides equal distribution of resiliency throughout the entire circumference of the wheel so that no one portion receives the entire burden. The makers claim that it is possible for a

## Truck Accessories

mechanic to apply a set of these wheels in less time than it takes to change a single pneumatic. He simply jacks up the truck, removes the pneumatic tire and rim, slips on the Morand demountable cushion element and solid tire, tightens the lugs and the work is done. The maker is the Morand Cushion Wheel Co., Chicago.

## Easyway Decarbonizer

THIS is a small device for introducing a decarbonizing liquid into the combustion chamber of a hydro-carbon engine. The outfit can be used for priming the engine, also for introducing lubricating oils to the cylinders, etc., and fresh air to the gasoline mixture above the carburetor when the engine is running medium and high speeds. The maker is the Easyway Products Co., 216 Centre Street, New York City.

## Kant-Slip Cord Tire

A NEW Kelly-Springfield tire with a special design of non-skid tread. Prices range from \$28.40 for the 30 by 3½, \$46 for the 32 by 4, \$65.40 for the 33 by 5, up to \$180 for the 40 by 8.

## Traf-O-Lite

THE new safety device now being marketed by the Automobile Device Co., Cleveland, was designed to be a mechanically perfect stop signal and to serve at the same time as a tail light for any truck. The latter is in the neck of the lamp and the license plate is illuminated through a waterproof glass opening. Forward rays from the tail-light bulb, light the red portions above and below the strip on which is the word "Stop." The signal works off the foot brake. The instant the brake is applied a high candlepower light just back of the outer lens lights automatically. The price is \$8.50.

## Ahlberg Transmission for Fords

THIS transmission is an auxiliary gearset. Two working gears are employed, one being of the internal type and the other of a spur type. The internal gear is brought into mesh with the spur radially. There is but one bearing employed in this unit, which is an annular ball bearing. Through the use of this device the Ford truck is given four speeds forward and two in reverse. The maker is the K. E. Ahlberg Co., 1724 South Hill Street, Los Angeles, Cal.

## Erie Underslung Power Winch

COMPACTNESS is the feature of this power winch. It fits in the rear end of the truck frame under the floor and is made to fit any chassis 33 in. or wider and up to a 9 in. frame. The winch can be arranged for operation either from the driver's seat or from the rear of the truck. The drum is driven by a friction clutch and is readily adjustable. The nigger-heads are independent of the drum and the outfit can be supplied without them if desired. The maker is the Erie Hoist Co., Erie, Pa.

## Mechanics Universal Joint

THIS is an oil lubricated universal joint which is designed to retain the oil over long periods. The principal parts are the housing, made in two parts, the two yokes with driving trunnions and the four bushings. The housing, which also serves as the connecting driving member, is made of pressed steel, and the edges of the housing are ground to make the joints oil tight. The maker is the Mechanics Machine Co., Rockford, Ill.

## Kick Type Truck Switches

THIS type of switch is built particularly to stand rough service on motor trucks. It may be mounted either on the dash or footboard, and in this way may be operated by foot or hand. It is equipped with an especially large lever, which facilitates easy movement with heavy drivers' mittens or gloves. It is made in six different models. Prices range from \$2.15 up to \$2.70. The maker is the Briggs & Stratton Co., Milwaukee, Wis.

## Seek Repeal of Burke Law

CLEVELAND, Sept. 2—A committee of five that represents every phase of the motor truck industry in Ohio has asked Governor Harry L. Davis to provide means for permitting the Burke law limiting the weight of motor trucks to be amended at the special session of the general assembly, which will be held next January.

When the Governor issued his call for the special session of the Legislature, the committee asked him to set forth amendment of the Burke bill as an order of business.

Members of the committee are P. A. Lewis, Springfield, of the Kelly-Springfield Truck Co.; W. W. Williams, Columbus, representing dealers; W. C. Free-lock, of the Liberty Cartage Co., Cleveland, representing users of trucks; H. A. Waddle of the Goodrich Tire & Rubber Co., representing tire manufacturers, and J. S. Schindle of Cleveland, representing business users of trucks.



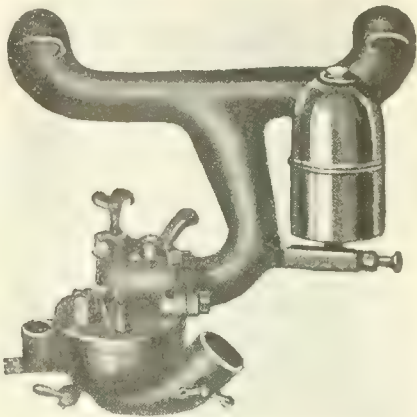
Buyer's Department of The Commercial Vehicle



"Dot" High Pressure Lubricator



Schrader Tire Valve Set



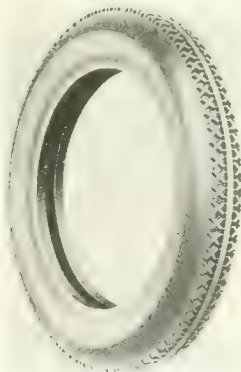
Easyway Decarbonizer



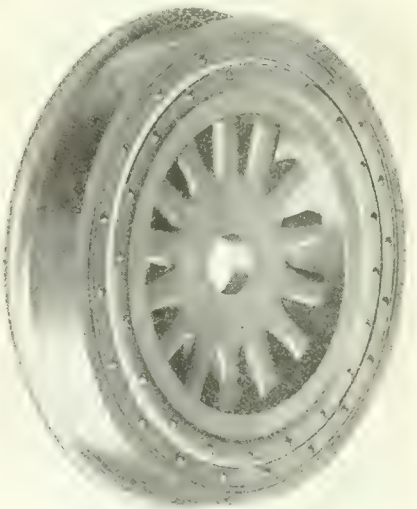
Traf-O-Lite



Ahlberg Transmission for Fords



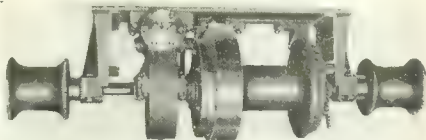
Kant-Slip Cord Tire



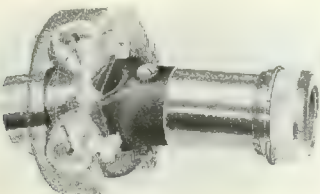
Morand Demountable Cushion Wheel



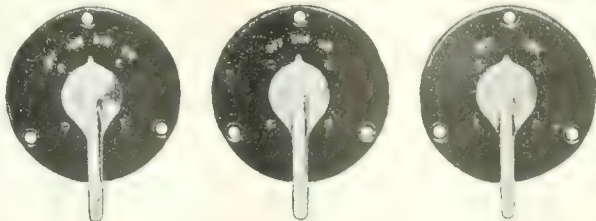
Mayo-Skinner Windshield Cleaner



Erie Underslung Power Winch



Mechanics Universal Joint



Kick Type Truck Switches



# Buyer's Department of The Commercial Vehicle

## Landis Cylinder Grinder

THIS machine has been especially designed for regrinding cylinders. The grinding wheel spindle center of rotation is 10 in. above the top of the work carriage so that large castings may easily be handled. The grinding wheel spindle regularly furnished will grind 15 in. deep and the wheels 2½ and 3 in. in diameter are included as regular equipment. The eccentric adjustment of the spindle ranges from 1/16 in. to 1 1/16 in. which permits grinding holes as large as 5½ in. The work carriage has a cross movement of 27½ in. The machine is arranged for either direct motor drive or for lineshaft drive through a small overhead counter. The maker is the Landis Tool Co., Waynesboro, Pa.

## Rebabbiting Jig

THIS is a special tool for rebabbiting the main bearings in a Ford engine. This jig may be used cold to babbitt bearings in a cold engine. It opens and closes like a jackknife and also shears off surplus babbitt. The maker is the Hempy-Cooper Mfg. Co., Kansas City, Mo.

## Under Dog Tool Tray

THIS tray is low enough to pass under the running board of any truck, and yet is large enough to hold all the tools needed for the average repair under the vehicle. The upper tray holds wrenches, cold chisels, screw drivers, pliers, etc., and the lower tray is fitted with pockets for cotters, nuts, washers and bolts of various sizes. The tray is made of cast semi-steel and mounted on four casters. It is painted red. The size is 10 in. by 12 in. by 7 in. The price is \$6. It is made by Walker Foundry Co., Erie, Pa.

## Bay State Wrench Set No. 10

THIS set consists of five broached steel sockets with an L-handle and a water-proofed bag with snap fasteners to retain them. The price is \$1.50 per set, the shipping weight is 1 lb., 7 oz., and the sizes are ½, 19-32, 21-32, 23-32 and 25-32. The maker is the Bay State Pump Co., Boston.

## GTD 400-Page Tool Catalog

THE Greenfield Tap and Die Corp., Greenfield, Mass., is now distributing a most comprehensive catalog describing the small tools and pipe tools which comprise the greater part of its products.

There are seventy or more pages of tables and useful information at the back of this 400-page book. The tools described include screw plates, taps, dies, drills, reamers, milling cutters, bits, arbors, countersinks, hobs, tap and drill kits, mandrels, sleeves, sockets, stocks, tap and pipe wrenches and pipevises.

## Shop Equipment for Fleet Owners

### Motoquip

A COMPLETELY equipped work bench for the use of the mechanically inclined truck owner. The bench is constructed with a maple top and is equipped with over fifty tools and devices for repairing and keeping the truck in good condition. On the backboard of the bench there is a silhouette of each tool painted in red, so that tools are always replaced in the same position. Included in the equipment is a tube-testing tank and a creeper. The maker is H. C. Dodge, Inc., 32 Alger Street, Boston.

### Homecharger

THIS is a device for charging the starting, lighting and ignition batteries, and may be used in any garage that is equipped with electric lighting. The device measures 5½ by 7 by 7 in. and is designed for mounting on the garage wall. It is attached to the nearest alternating current lamp socket by means of an ordinary attaching plug. In order to facilitate charging, a neat nickel plated receptacle is furnished for mounting upon the dashboard which is connected permanently to the wiring of the truck. It is only necessary to insert the charging plug into this receptacle and the battery immediately starts to charge. It is stated that the cost per full charge with an ordinary 6 or 12-volt battery is from 4 to 5 cents for current.

As the charging rate automatically tapers as the battery becomes charged, no harm, it is stated, results if the battery should be left connected indefinitely. The retail price complete is \$18.50. The maker is the Automatic Electrical Devices Co., 120 W. Third Street, Cincinnati, Ohio.

### Manley Truck Wheel Dolly

THIS conveys, raises and lowers truck wheels. All of the operations can be accomplished by one man. After the truck has been jacked up, the projecting forks of the dolly are lowered until they pass under the wheel. The crank handle is then turned until the weight of the wheel rests on these forks, and the dolly with its load may then be pulled out. Thirty seconds to one min. is all the time, it is stated, that is required to do this.

If the wheel is to be moved on the dolly, the holders are then swung against

the tire, hooks adjusted back of the inner rim and the hand nuts tightened. These holders are to keep the wheel from falling off the forks when pulling the dolly.

The spread of the forks is such that when they are lowered to the floor they clear the tire of the wheel. When the crank handle is turned they are raised, elevating the wheel which then rests on these forks. When the wheel is raised high enough to clear the floor it is supported by the dolly and its four casters, permitting the operator to convey it with ease to any location desired. The maker is the Manley Mfg. Co., York, Pa.

### Valley Buffer and Grinder

THE Valley electric buffer and grinder manufactured by the Valley Electric Co., St. Louis, is a self-contained dustproof unit mounted either on a 30-in. pedestal, or an 8-in. stand for bench installation. As the shaft extends from both ends of the apparatus two grinder wheels, or one wheel on one side and a wire or buffing brush on the other can be used as desired. The units are supplied in all horsepowers ranging from ½ to 4 and in speed from 1800 to 3600 r.p.m. The standard machines are wound for 100 or 220 volts, 60 cycles, 2 or 3 phase AC. Direct current outfits will be supplied when desired.

### Adjustable Socket Wrench

THE opening of the wrench is adjustable from ¾ in. up to 1½ in. by means of a screw. It is shaped so that inaccessible nuts can be conveniently reached. It is drop-forged and case hardened, and has a smooth, gun-metal finish. It is 10 in. long and weighs 1½ lbs. The price is \$2.50 and the makers are Hutton & Hutton, sales agents, 127 Spring Street, Springfield, Mass.

### Lowell Vulcanizer

THE Model 21 vulcanizer is equipped with a steam gage, safety valve, filler valve, water level valve and an inside curing core, yokes and screws. The cost complete without gas burner to be connected to the generator is \$175. The burner costs \$9 extra.

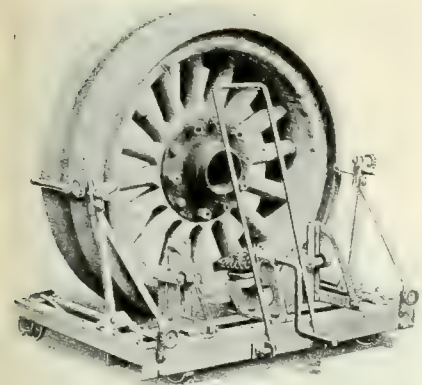
The cavity measures 8 in. in width. The diameter of the circle is 42 in. This makes it large enough to cure pneumatic truck tires.

The reducing shells and bead molds are machine finished and polished and are made to fit accurately all tires of their respective size. The bead molds are all made of the same diameter.

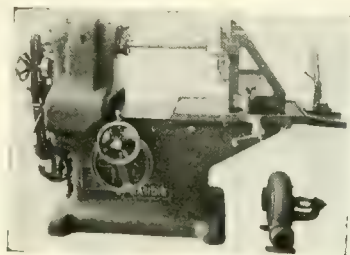
The Auto Tire Vulcanizing Co., Lowell, Mass., which manufactures this vulcanizer, has designed its molds for the repair of both flat tread and round tread pneumatic truck tires on all sizes from 6 to 10 in.



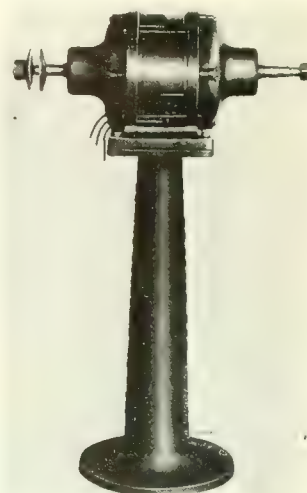
# Buyer's Department of The Commercial Vehicle



Manley Truck Wheel Dolly



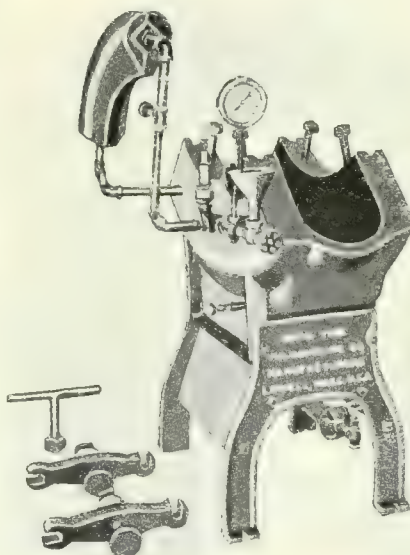
Landis Cylinder Grinder



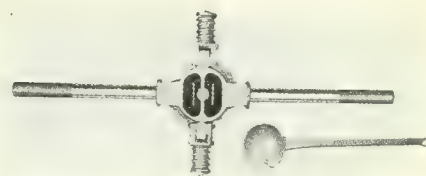
Valley Buffer and Grinder



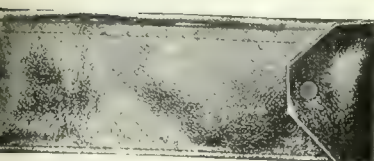
Adjustable Socket Wrench



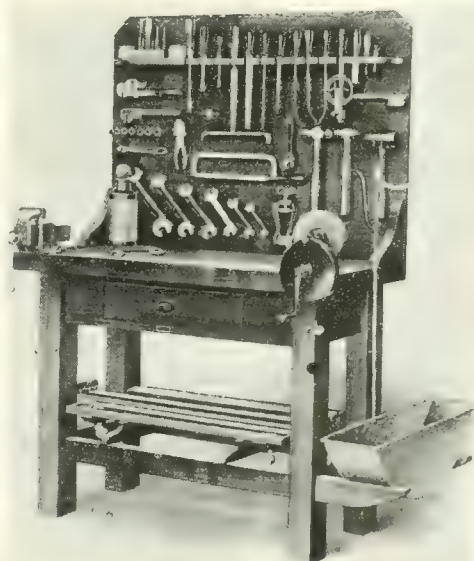
Lowell Vulcanizer



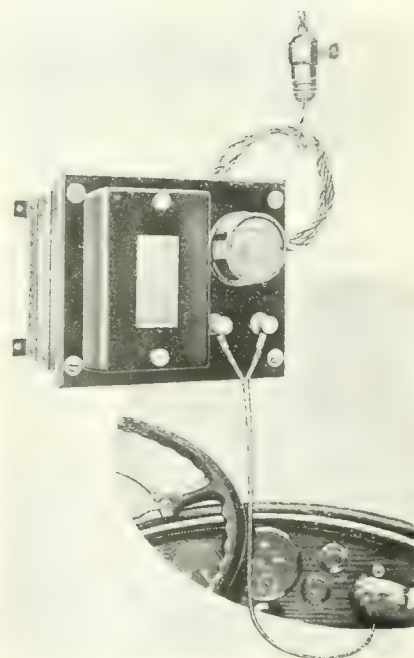
Rebabbiting Jig



Bay State Wrench Set



Motoquip

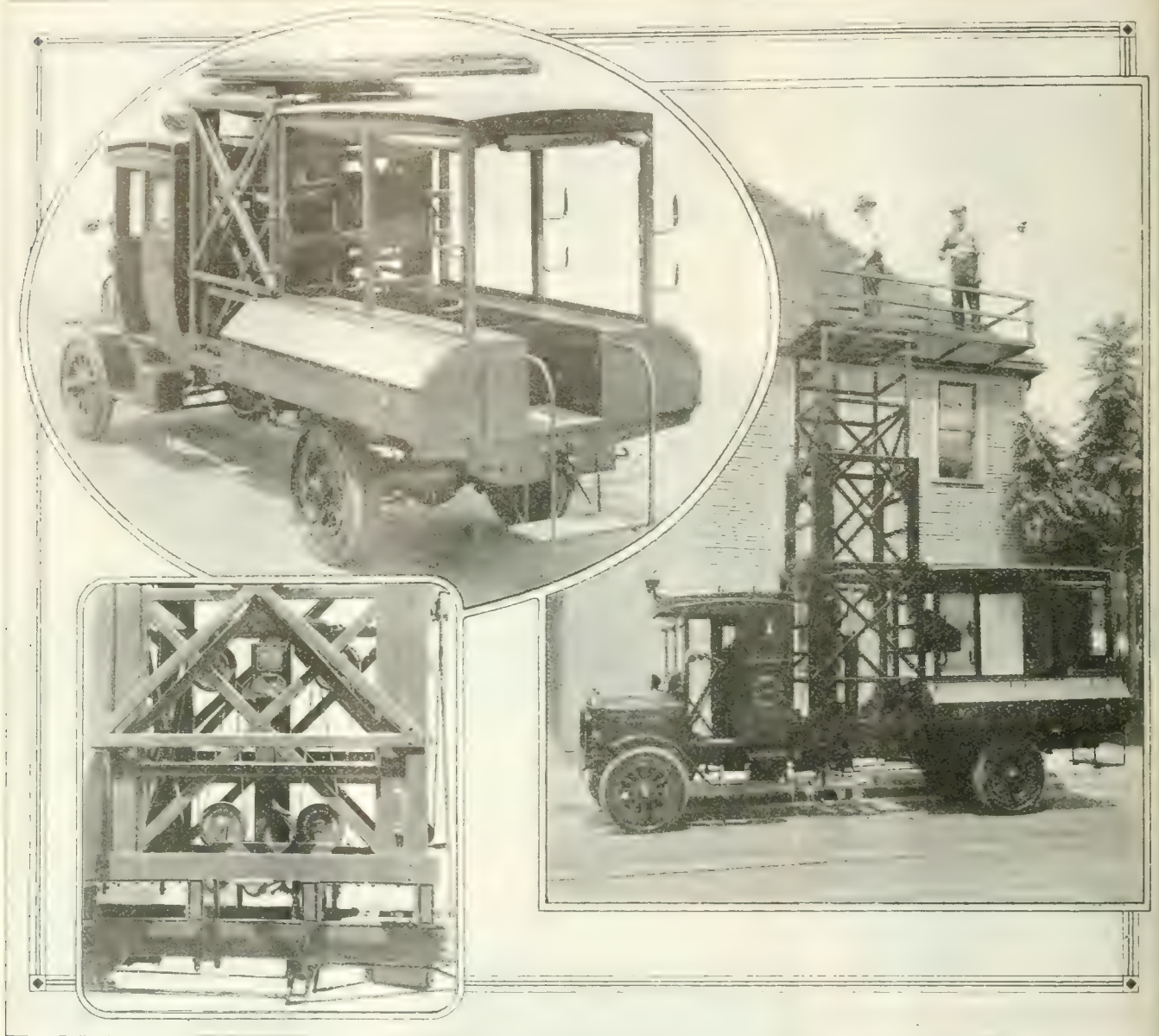


Homcharger



Under Dog Tool Tray

# Hydraulic Elevated Trolley Tower Truck



**T**HIS tower can be elevated or lowered in less than a minute by moving a lever which is within reach of the driver's seat. The three-section Trenton tower is located between the cab and body. The tower is operated by a Wood hydraulic hoist, located on two cross members in the center of the tower. The hydraulic hoist is hooked up with the hand hoist arrangement so that in case of emergency or when the engine is not running, the tower can be raised easily by one man turning a crank. The tower lowers by gravity and the hand arrangement is fitted with a brake to control the downward speed of the tower. The inclosed cab has sliding doors and is fitted with an auxiliary roof to allow the workmen to walk on it. A ladder

shaped to the contour of the cab side is attached to provide means of getting on the tower platform.

The body is equipped with four longitudinal tool boxes. Two inside tool boxes are full length of the body and the two outside ones, which are longer, straddle the tower frame. The covers of the outside tool boxes are on an angle so arranged as to keep the contents dry in wet weather.

There are six double 8-in. hooks attached to the body posts for hanging on coils of rope and wire, etc. The inside tool boxes will be used as seats for the workmen. The passageway between them has provisions for removable partitions to make four extra large compartments.

The body can be completely inclosed in inclement weather with curtains that are rolled up and attached to the top of the body.

The chassis is equipped with a pintle hook and both front and rear two hooks. The electric lighting equipment consists of two headlights, one tail light, two dash lights, one spot light and search light. The searchlight is mounted on the top of the cab and is so arranged that it can be swung in any direction to illuminate the work while repairs are being made.

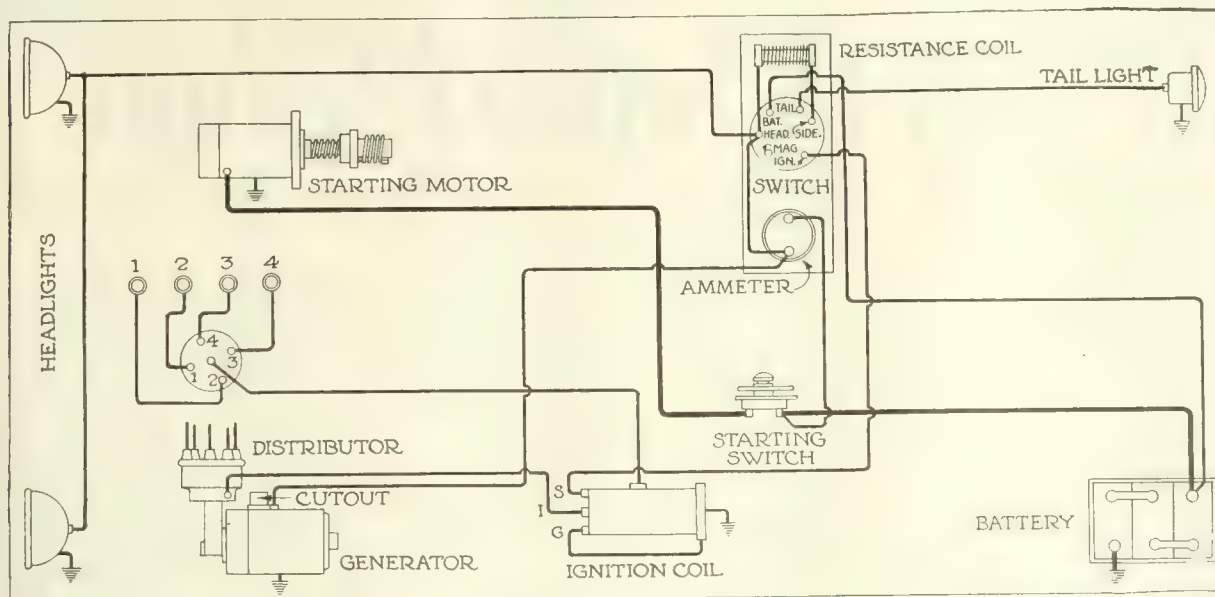
The total height from the ground to the tower platform when elevated is 19 ft. 6 in.; when lowered it is 10 ft. 4 in.

The truck is manufactured by the Standard Motor Truck Co., Detroit.



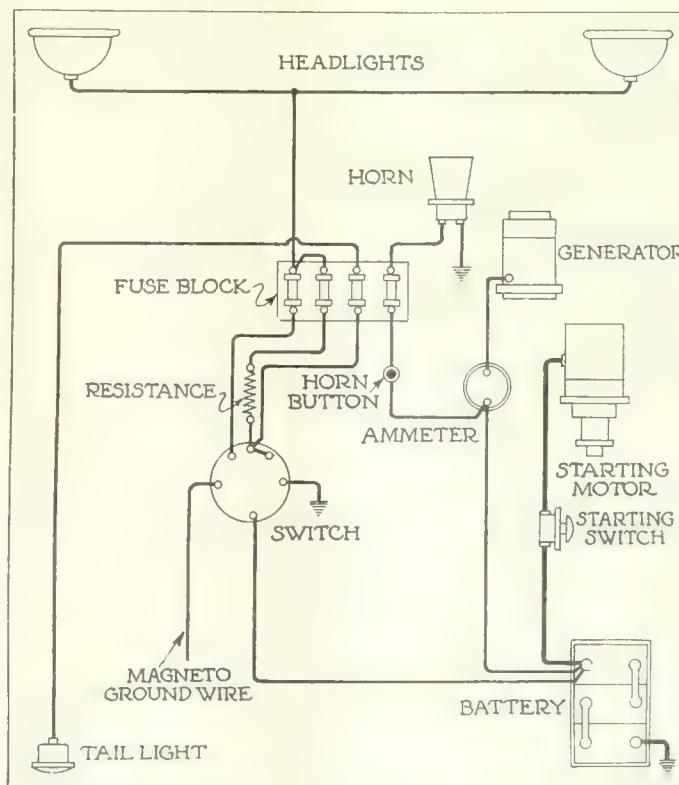
# Motor Truck Electric System Wiring Diagrams

## 36—Starting and Lighting Unit on Napoleon Trucks



Wiring diagram of the starting and lighting system used on the Napoleon trucks

## 37—Starting and Lighting Unit on Dorris Trucks



Wiring system used on the 2½- and 3½-ton Dorris trucks. Equipment includes Westinghouse starter, generator and ammeter and Willard battery

### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE.

#### 1920

1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting.....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15

#### 1921

12—Maxwell, Lighting.....	Jan. 15
13—International, Starting and Lighting.....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 15
17—Feo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Apr. 15
19—Stewart, Starting and Lighting.....	May 1
20—Kelly-Springfield, Starting and Lighting.....	May 15
21—Riker, Starting and Lighting.....	May 15
22—U. S., Starting and Lighting.....	June 1
23—Wilcox, Lighting.....	June 1
24—Pierce-Arrow, Starting and Lighting.....	June 15
25—Republic, Starting and Lighting.....	June 15
26—Parker, Starting and Lighting.....	July 1
27—Noble, Starting and Lighting.....	July 1
28—Onelda, Starting and Lighting.....	July 15
29—Oshkosh, Starting and Lighting.....	July 15
30—Knox, Starting and Lighting.....	Aug. 1
31—Master, Lighting.....	Aug. 1
32—Watson, Starting and Lighting.....	Aug. 15
33—Service, Lighting.....	Aug. 15
34—Packard, Starting and Lighting.....	Sept. 1
35—Tiffin, Starting and Lighting.....	Sept. 1
36—Napoleon, Starting and Lighting.....	Sept. 15
37—Dorris, Starting and Lighting.....	Sept. 15



# The Fleet Owners' Forum

## Reader Is Confused in Estimating Horsepower

To the Editor, COMMERCIAL VEHICLE:

How do you figure horsepower of an engine? We have had several tell us but it seems that no two have the same formula. Figuring from the average of several different styles of engines about how many cubic inches of piston displacement does it require to each estimated horsepower and to the actual delivered horsepower?—J. A. MORLING & SON, Cameron, O.

The principal defect of the old, original A. L. A. M.—later the S. A. E.—formula is that it has become obsolete. It was calculated on an assumed piston speed of 1,000 ft. per minute, and as there is hardly an engine in service today that does not exceed this speed at maximum, the formula is no longer a correct guide. The old formula is expressed thus:

$$\frac{D^2 N}{2.5}$$

This, worked out in simple arithmetic, is piston diameter times piston diameter times number of cylinder divided by 2.5. The 2.5 is a constant which embraces an assumed mean effective pressure of 90 lb. per sq. in. of piston head area, a mechanical efficiency of 75 per cent and a piston speed of 1,000 ft. per minute. If any of the latter factors are incorrect the solution arrived at by means of the formula is erroneous.

Another formula, called the modified S. A. E. formula, was worked out by *Motor Age* a few years ago and seems more nearly to meet present-day conditions. By it the piston speed is taken into consideration. Stated briefly, it is

$$\frac{D^2 N S R}{15,000}$$

or diameter square times number of cylinder times piston stroke in inches times crankshaft revolutions per minute divided by 15,000. The denominator, 15,000, is a constant which more nearly applies to present-day engines than does the one of 2.5 of the original formula. Although, after all, the only correct way to determine the actual horsepower of an engine is by electric dynamometer test, it is remarkable how nearly the estimate, as figured by the last formula, coincides with the actual values as found by test.

Your second question is impossible to answer. Of course, it is possible to take the average displacement of several different makes of engine. However, when it comes to correlating this with the actual horsepower, the factor of varying

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

piston speeds so upsets all calculations that the conclusions are worthless. The following table, based on the original S. A. E. formula, may prove of assistance to you:

HORSEPOWER TABLE

Bore in inches	Number of Cylinders	
	Four	Six
2 1/2	10.00	15.00
2 5/8	11.23	16.85
2 3/4	12.08	18.13
2 7/8	13.37	20.00
3	14.40	21.60
3 1/8	15.64	23.50
3 1/4	16.92	25.39
3 3/8	18.21	27.30
3 1/2	19.61	29.45
3 5/8	21.08	31.57
3 3/4	22.50	33.75
3 7/8	24.22	36.32
4	25.60	38.40
4 1/8	27.20	40.80
4 1/4	29.00	43.50
4 3/8	30.65	46.00
4 1/2	32.40	48.60
4 5/8	34.28	51.41
4 3/4	36.15	54.20
4 7/8	38.25	57.21
5	40.00	60.00
5 1/8	42.20	63.20
5 1/4	44.20	66.40
5 3/8	46.34	69.50
5 1/2	48.48	72.72
5 5/8	50.80	76.10
5 3/4	53.00	79.50
5 7/8	55.28	83.88
6	57.70	86.64

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

## Ford Engine Boils—Hard Time Finding Solution

To the Editor, COMMERCIAL VEHICLE:

What causes a 1917 Ford car to over-heat? After running about two or three miles it will start to boil. There is nothing wrong in the cooling system, as we have cleaned the radiator and the fan runs well. Both light and heavy oil have been tried, but neither seems to make any difference. The spark is kept retarded as much as possible, but that does not help. We have also cleaned out the carbon, ground the valves, and put in a new set of the regular Ford piston rings. Is it possible that the front cylinder cannot be getting enough oil?—J. PAULSON, Hilland, S. D.

By keeping the spark retarded you doubtless mean that you keep the lever pulled back. This is not the retarded but the advanced position, and is correct. It is barely possible that the oil feed pipe is partially clogged up, but we rather question this, as burned-out bearings should have resulted before this time if it were true.

It can be checked easily by overloading the engine with oil so that you can be certain that the connecting rods are dipping into it. If this remedies the heating it indicates that the oil feed system is at fault. When such is the case the number one cylinder is the least likely to suffer, as it gets the oil first. If the engine has been disassembled lately it is quite possible that it is timed a trifle late. This point should be checked. You do not state what steps were taken in cleaning the radiator. A strong solution of lye water will clean out scale, and the muriatic acid-baking soda treatment will clean out the residue of anti-freeze solutions.

## Valve Diameters and Lifts—Calculation of

To the Editor, COMMERCIAL VEHICLE:

What is the valve diameter and what should be the valve lift on a 3 1/2 by 5 1/2-in. engine to get the most power and the best results? Is there a standard formula for figuring valve specification in an engine?—R. M. C., Kansas City Mo.

This question comes under the heading of engine designing and is difficult to formulate without knowing the other factors such as valve arrangement, size, and shape of combustion chamber, type of cam and cam follower it is desired to use, and like points. However, a very successful high speed engine of the dimensions given has valves of 1.9375 in.



diameter, in the clear, and a lift of about  $\frac{3}{8}$  in. Another popular make used a 2-in. valve with a  $\frac{3}{8}$ -in. lift while another has valves of  $1\frac{1}{4}$  in. diameter and only  $11/32$ -in. opening. The size and the lift are governed by the speed of the gas at maximum engine speed. This has been found to be about 14,000 feet per minute.

There are two or three formulas. They are lengthy and complicated for publication in these columns. You will find them in "Gasoline Automobile," Volume 1, written by P. M. Heldt, Nyack, N. Y., and "Motor Vehicle Engineering" by Ethelbert Favary, published by the McGraw-Hill Book Co., 370 Seventh Avenue, New York City.

### Hydrometer Gives Most Accurate Reading of Battery

To the Editor, COMMERCIAL VEHICLE:

What is the best method of determining the state of charge of a lead storage battery such as used in electric vehicles?—A. SPRYER, New York City.

The hydrometer supplies the best test, since the specific gravity of the electrolyte is determined by the state of charge. A high specific gravity represents a high state of charge and a low reading a low state of the charge.

The maximum specific gravity for most batteries is 1.300 and the minimum 1.200. The maker of a battery will supply an owner with a chart showing the hydrometer readings for maximum and minimum charge and in some cases with the equivalents of readings in between.

Take hydrometer readings at a temperature of 70 deg., which is about normal.

### Drawbar Pull Table Made Up in Non-Technical Form

To the Editor,

COMMERCIAL VEHICLE:

We note in your issue of July 15 the table for drawbar pull. We have adopted the system of using a non-technical table which will help the average non-technical truck operator figure out to a reasonable certainty what his truck may do.

There are several systems for figuring how much a truck will pull. All of them, of course, are based on the truck equipment being in excellent working condition and handled by a good driver. An average 5-ton truck has a drawbar pull of 4300 lbs.; a 3-ton truck, 3200 lbs.; a 2-ton truck, 2100 lbs.; a 1-ton truck, about 1500 lbs., and a Ford from 900 to 1000 lbs.

This table shows the payload the average truck of a given tonnage will pull on a trailer of equivalent capacity under various load conditions.—F. D. BURGESS, Aradia Trailer Corp., Newark, N. Y.

Grade of Road	Size of Truck	Asphalt, Brick, etc. Best Pavement	Hard Macadam, Gravel or Clay, Dry	Soft Country Roads, Sand, or Broken Macadam	Deep Mud or Sand
Level Road	5 Tons	•	•	•	1 Tons
	3 Tons	•	•	•	1 Tons
	2 Tons	•	•	•	1 Tons
	1 Tons	•	•	•	1 Tons
Easy Grade	5 Tons	•	•	1 Tons	1 Tons
	3 Tons	•	•	1 Tons	1 Tons
	2 Tons	•	•	1 Tons	1 Tons
	1 Tons	•	•	1 Tons	1 Tons
Per Cent.	Ford	•	•	2 Tons	1 Tons
Average Hill	5 Tons	•	12 Tons	9 Tons	3 Tons
	3 Tons	•	9 Tons	6 Tons	1 Tons
	2 Tons	•	6 Tons	4 Tons	1 Tons
	1 Tons	•	4 Tons	2 Tons	1 Tons
Per Cent.	Ford	•	2 Tons	2 Tons	1 Tons
Fairly Steep	5 Tons	9 Tons	7 Tons	5 Tons	1 Ton
	3 Tons	7 Tons	5 Tons	4 Tons	1 Tons
	2 Tons	5 Tons	4 Tons	3 Tons	1 Tons
	1 Tons	3 Tons	2 Tons	2 Tons	1 Tons
Per Cent.	Ford	2 Tons	1 Tons	1 Tons	1 Tons
Steep Hill	5 Tons	6 Tons	5 Tons	4 Tons	1 Ton
	3 Tons	5 Tons	4 Tons	3 Tons	1 Tons
	2 Tons	4 Tons	3 Tons	2 Tons	1 Tons
	1 Tons	3 Tons	2 Tons	1 Tons	1 Tons
Per Cent.	Ford	1 Tons	1 Tons	1 Tons	1 Tons
Heavy Grade	5 Tons	•	3 Tons	2 Tons	•
	3 Tons	•	2 Tons	1 Tons	•
	2 Tons	•	1 Tons	1 Tons	•
	1 Tons	•	1 Tons	1 Tons	•
Per Cent.	Ford	•	1 Tons	1 Tons	•

\*Tonnage limited to local traffic regulations.

†Hard pavements not constructed on heavy grades.

### Shipping Clerk's Cost Is Part of Delivery Expense

To the Editor, COMMERCIAL VEHICLE:

Is it customary among big department stores in figuring the cost per stop of delivery to include the shipping clerk and his help with the drivers' salaries and truck expenses? Do you know of any forms for daily and monthly reports for trucks operated by department stores?—J. J. K., Boston.

All items which enter into the cost of handling a package which is delivered, but which do not enter into that of a package taken home by the customer, are a part of delivery expense. The shipping clerk devotes himself entirely to packages which are delivered, and therefore, his entire cost and that of his assistants should be charged, with motor trucking and other delivery expenses, to delivery.

The cost system of THE COMMERCIAL VEHICLE has been described in these columns on numerous occasions. A cost story using this trucking cost accounting system appears in most every issue.

### Gasoline and Oil Consumption Varies

To the Editor, COMMERCIAL VEHICLE:

Will you please publish in your next issue figures to indicate the average gasoline and lubricating oil consumption per mile for motor trucks of  $\frac{1}{2}$ , 1,  $1\frac{1}{2}$ , 2, 3,  $3\frac{1}{2}$  and 5-ton capacity.—J. MCCARTHY, New York City.

It is very difficult to give any accurate average figures on gasoline or oil consumption of motor trucks because these vary greatly even with the same makes and capacities of trucks according to the conditions of loading and roads. For instance, some truck owners who load their

3-ton trucks with  $3\frac{1}{2}$  to 4 tons of goods naturally have a higher gasoline and oil consumption per mile than do other trucks owners who carry only 3 tons of load in 3-ton trucks and still others whose trucks run only partly loaded on one leg of the trip and empty on the return run.

Roads also have a considerable influence on gasoline and oil consumption as it is evident that trucks running over well-paved city streets will naturally consume less gasoline per ton-mile than the same vehicles would traveling over semi-improved country roads.

The following figures may be taken as a rough approximation of the gasoline and oil consumption of the various sizes of trucks mentioned in your inquiry:

Truck Capacity Tons	Gasoline m. p. g.	Oil m. p. g.
$\frac{1}{2}$	12 to 14	200
1	10 to 12	200
$1\frac{1}{2}$	9 to 11	180
2	8 to 10	175
3	6 to 7	150
$3\frac{1}{2}$	5 to 6	150
5	4 to 5	100

### Carbon Deposit Depends Upon Operating Conditions

To the Editor, COMMERCIAL VEHICLE:

How quickly will sufficient carbon collect in a gasoline engine so as to make it necessary to clean out the cylinders?

2. In the average life of an engine how many times must carbon be burned out?

3. What is the average cost for burning carbon out of engines?

4. Are there any preparations on the market for mixing with the gasoline that will eliminate carbon without damage to the engine?—W. YOUNG, Omaha, Neb.

1. This will depend entirely upon the care which the engine receives, the kind of oil employed, the rate at which it is fed, and the accuracy of the carburetor adjustment. The manner in which the spark is handled has something to do with carbonization also. Some users do not need to clean out carbon oftener than once in 3 years, others find a carbon deposit in their cylinders after only a few days.

The proper kind of oil will not leave a great deal of carbon when it burns, such as it does leave being soft and readily dissolved and blown out by the injection of a little kerosene in the warm cylinders or by squirting a little water in the carburetor air inlet when the engine is running.

Any oil will carbonize, however, if it is fed too copiously, constantly or at times. An over-rich gas mixture will also cause carbon deposits. A late spark will act very much as an over-rich mixture.

2. See answer to Query 1.

3. Most garages charge from 75c. to \$1.25 per cylinder.

4. There are a number of such. For a list refer to the Automobile Trade Directory, published by the Automobile Trade Directory, Inc., 239 West 39th Street, New York City.





## Insuring the Load

**T**HE truck operator in inter-city haulage must have protection. He must be able to insure his truck and he must be able to insure the goods his truck carries. He must have that insurance at a reasonable rate. Otherwise inter-city haulage at the present time and in certain localities is too much of a gamble for a wise business man.

Quite recently an insurance company, which included the pilferage clause in insuring goods carried by trucks, had losses aggregating \$120,000 in six weeks. Since that time that company—and several others—ceased issuing full coverage policies. For the above loss included two losses of \$40,000 each within one week.

But the truck operator can neither afford to do without insurance on his load against pilferage nor to pay an exorbitant premium. He must have this insurance.

He can get it by pooling his interest with that of other operators—that is, through the association idea. And he can get it by taking the question up with the insurance companies in a reasonable spirit. And he can get it by backing the insurance companies in their efforts: First, to obtain protection and help from the State police, and, second, to work out a reasonable mutual protection plan for the operators themselves.

One insurance firm has already outlined such a plan and is, in part, putting it into execution. This firm has fathered an association called the Shippers' Protective League, which supplies armed guards for

trucks running between New York and Philadelphia, where many of the thefts took place. The insurance company has also inserted a clause in its theft insurance policy stipulating that the trucks on which goods are insured shall travel in a convoy and shall be accompanied by armed guards furnished by the Shippers' Protective League.

Finally, through various merchants' associations, this company is endeavoring to enlist the co-operation of the State constabularies in patrolling the roads where the thefts have occurred and where others may be expected.

This is a step in the right direction. But it is a striking commentary on the need for co-operation among truck operators that this step should have been taken by an insurance company instead of by the operators themselves.

Now that the step has been taken, however, operators can at least get together and back up the demand for protection and the plan to co-operate in this protection by sending their trucks out in convoys instead of singly.

The plan sounds like a war measure. In effect it is a war measure. For trucks in certain localities seem to be about as open to attack and pilferage as if the country were invaded and the trucks were wandering in the vicinity of the enemy's lines.

And we have only ourselves to blame if this state of affairs continues, because it will not continue if truck operators will get together and take the steps outlined above to put an end to it.

## Example of Indiana

**S**PEAKING of the association idea, it is a pleasure to note the progress made in this regard in Indiana. Trucking affairs in that State have been progressing toward real, active co-operation between trucking interests for a long time. This progress has now reached a definite and highly valuable pinnacle.

The pinnacle in question is the tying together, in a conference body, of the chief executives of seventeen State organizations of industrials using motor trucks in inter-state and intra-state traffic.

It is also the plan to appear before the board of

executives of every State organization and sell the idea. This accomplished—and it will be accomplished if progress to date is any criterion—the conference will protect haulers against excessive and double taxation, against poor roads and poor streets and against railroad propaganda. It will also circulate educational data and business operation systems, methods, etc.

Indiana has set an example here which other states might well follow. They will follow it eventually. Why not now?



## Maine Limits Weight of Trucks

**Gross Weight Not to Exceed 18,000 Lbs.—Taxes Based on Capacities**

AUGUSTA, ME., Sept. 13.—A new era in motor truck regulation has begun in Maine and a new phase of the new law is that hereafter no motor truck can carry a gross weight of more than 18,000 lb. distributed by four wheels on a road surface or having a gross weight on any one axle exceeding 13,500 lb. As a result inspectors are busy stopping overloaded trucks, and shippers outside of the State fear that it will curtail their long hauls into Maine.

In cases where the gross weight is distributed upon six or more wheels by the combined use of a trailer, or otherwise, so that the imparted weight from any one axle shall not exceed 13,500 lb., the permissible gross weight may be increased not exceeding 50 per cent. But no vehicle having a load of over 700 lb. per inch width of tire upon any wheel concentrated upon the road surface shall be operated upon any way or bridge. The fees for motor trucks vary from \$10 to \$110, the lower figure applying to trucks with a capacity of 1000 lb. or less and the higher figure to trucks of over 4 tons.

The law fixing the limit of motor trucks to 18,000 lb. or 9 tons, has been on the statute book for some time, but it had not been enforced and many trucks of much heavier weight had been traversing the highways of Maine.

Another phase of the law requires that every motor truck carrying objects which project more than 5 ft. from the rear shall carry a red light during the night near the rear end of the objects and during the daytime shall display a danger signal at that end. Trailers having more than two wheels will be required to be connected to the towing vehicle by at least one chain, in addition to the hitch bar, of sufficient strength to hold the trailer on a hill, if the hitch bar becomes disconnected.

Henry A. Shorey, who has been made chief of the division of motor vehicles in the department for the enforcement of regulations, says that a 5-ton truck loaded to capacity will go over the legal limit.

Incidentally, a motor truck load is limited by dimensions also. It must stay within the limits of 12 ft. high and 8 ft. wide.

## Trailers Are Vehicles, Says Ruling, So Must Carry License

COLUMBUS, OHIO, Sept. 7.—According to an opinion rendered by Attorney General John G. Price, trailers are classed as motor vehicles in the meaning of the registration law and must be provided with license tags in front and behind. This ruling was called forth because of

## Trucks Barred from Making Long Hauls with Liquor

SAN FRANCISCO, CAL., Sept. 10.—There are too many "leaks" in a motor truck for it to be used successfully as a transporter of liquor is the opinion of the prohibition enforcement officers in this district. It is estimated that more than half a million dollars worth of liquor legally in transit has been stolen from motor trucks in the past year in this district alone. Therefore, the enforcement agents have issued a ruling that, whenever liquor is to be moved, as from a bonded warehouse to shipside, or to trains, or from such supply stations to drug stores, the owner must inform the enforcement officers in writing as to how he plans to move it, and, if the method of transportation happens to be by motor truck, it will be changed to train, boat or express, if possible. This applies to local shipments.

When the shipment is to be inter-State or intra-State, motor trucks must not be used. In other words, the motor truck is barred on long hauls of liquors. Even though the carriage by train, express or boat is more expensive than by motor truck, the liquor must be handled by one of the first three ways, save only in exceptional cases, in which permission is granted by the enforcement agents or the prohibition director, for movement in motor trucks.

the practice of some trailer owners of using but one tag on a trailer or none at all.

## Seek 2-Ton Limit in New Orleans

NEW ORLEANS, LA., Sept. 12.—All motor vehicles with a combined weight of truck and load of more than 2 tons and all horse-drawn vehicles weighing, with load, more than 2300 lbs. would be barred from certain residential streets of the City of New Orleans under the terms of a municipal ordinance just introduced in the city council by Commissioner of Public Safety Ray.

The ordinance also fixes size limits of motor trucks, specifying that no truck shall exceed 30 feet in length and, with trailer, two being allowed, shall not exceed 70 ft. in length. Exceptions in the ordinance grant the barred vehicles the privilege of making immediate delivery within the limits specified or of taking on loads therein.

According to weight and tires the speed limit of motor trucks is fixed at from 15 to 20 m. p. h. in the daytime and not more than ten miles per hour after nightfall. The ordinance also designates certain paved streets as heavy traffic avenues through which the vehicles forbidden to the residential section would be expected to pass.

## Indiana Association Makes Progress

**Committee Formed to Draft Constitution, By-Laws, and Ideals of Conference**

INDIANAPOLIS, IND., Sept. 10.—Formation of a permanent conference of commercial vehicle operators of Indiana soon will be an accomplished fact, bringing together the chief executives of seventeen state organizations of industrials using motor truck transport in inter-state and intra-state traffic. The combined investments of the businesses to be brought together in this educational and legislative conference will represent millions of capital; millions invested in thousands of commercial vehicles. The memberships in the individual state organizations to be affiliated will reach into every county and practically every commercial pursuit in the State.

The proposal for the tying together in a conference body of these state groups developed in a recent session attended by leaders of the various organizations to discuss an entirely different subject. In a recent meeting, the plan took definite shape when L. M. Shaw, secretary-manager of the Indiana Automotive Trade Assn., urged that the chairman and secretary who had been temporarily chosen, be empowered to continue and that a committee be appointed to draft constitution, by-laws, outline of the purposes and ideals of the conference. The suggestion was adopted. Tom Snyder, secretary of the Indiana Highway Transport & Terminal Assn., L. M. Shaw of the Indiana Auto Trade Assn.; and A. E. Pierson, secretary of Indiana Building Contractors, were named as this committee.

W. O. Moore, Indianapolis Wholesale Grocers' Assn.; W. S. Frye, Indiana Transfer & Warehousemen's Assn.; R. H. Graham, Indiana Coal Dealers' Assn.; were named as committee to prepare a schedule of per capita tax.

It is the intention to appear before the board of directors of every State organization and sell the idea. Collection of a per capita tax will permit of building quickly a conference with sufficient activity and strength to be effective in municipal and State legislation. Protection of the haulers against excessive and double taxation, against poor roads and poor streets, against railroad propaganda, also for circulation of educational data, of business operation systems and methods, etc., will be the purposes of the organization.

## N. A. C. C. Against Overloading

NEW YORK CITY, Sept. 13.—The National Automobile Chamber of Commerce is calling upon police officials for a more strict enforcement of the traffic laws as regards speeding and overloading of trucks. The N. A. C. C. believes that a 2-ton truck carrying 4 tons is more dangerous than a 5-tonner with its normal load of 5 tons.



## ✓✓ New England Roads to Fight Trucks

### Short Haul Competition Has Been Keen Since 40 Per Cent Increase of Rates

BOSTON, Sept. 12.—Motor truck competition on long and especially short hauls has made such inroads on the earnings of railroads in New England since the last increase of 40 per cent in freight rates as to attract the attention of higher rail-transportation officials. They have, as a result, directed that an inquiry be conducted with a view of bringing about remedial action.

Railroad freight experts have been interviewing shippers lately on the subject of regaining some of the business lost to motor trucks. Much business has been lost in the handling of raw and finished materials for the many manufacturing plants and mercantile houses.

Trucks are used not only between this territory, Providence and New York, but on shorter hauls to steamer termini. Many of the mills and mercantile houses own and operate their own trucks while many firms are engaged in the trucking business by contract.

Steamship lines, with a view of getting the patronage of small shippers, have inaugurated a truck service of their own, from their docks into the surrounding territory for a 50- or 100-mile radius.

It has been estimated that for the city of Lynn alone, a big shoe center, the Boston & Maine has lost \$1,000,000 of business per annum, through diversion to motor trucks. Though this road made reductions in local express rates within 50 miles of Boston as a result of this loss, this move, it is stated, is only a partial solution of the truck competition problem and it is probable that other and more comprehensive steps may be initiated. Motor truck operators, it is stated, are considering meeting all cuts in rates of the railroads. So it is war until one or the other may be wiped out. The recent cut made by the Boston & Maine was 50 per cent. This amounts to 9 cents per 100 lb. with a \$20 minimum load.

### Hartford Buses Under New Control

HARTFORD, CONN., Sept. 6.—The Connecticut Co., which operates and controls all the trolleys in Hartford and surrounding territory is now running Reo passenger buses between the tunnel and the railroad station as an accommodation to the public. In a sense this is a short crosstown line running from north to south.

Buses have disappeared from the streets of Hartford as regular passenger carriers it being quite impossible to run them under the new law which leaves the granting of registration or license largely up to the public utilities commission and the bus owner who would bid for fares must prove there is need for his

### Thorough Inspection of Trucks in Connecticut—Little Time Consumed, However.

HARTFORD, CONN., Sept. 14.—Connecticut State officials are determined, it seems, not to allow trucks entering that State from Massachusetts to pass through without first being given a thorough inspection. The main idea, of course, is to prevent overloading, though the officials state that they also wish to help the trucking industry in general by using other information received for the development of good roads, loading methods and to furnish shippers with better ideas on operation.

It has been found possible to weigh a truck, measure the tires, gain the necessary information from the driver and give the running gear a quick inspection in 1 min. and 10 sec. The make of truck, State in which registered, city from which run started, destination, weight and character of load, relative distribution of load between the front and rear axles, and tire condition are noted also.

services and that he does not compete with the established common carriers. Isolated sections are now clamoring for the trolley company to put on more buses. In a nutshell the private individual finds it difficult to operate a bus or two but the trolley company can and does.

### Seattle Stops Buses

SAN FRANCISCO, CAL., Sept. 2.—Reports reaching the automotive interests here are that the City of Seattle has succeeded in its attempt to put the motor buses out of business, wherever they conflict in any way with the operation of the municipally owned street car lines. Ousting of the buses from the streets was accomplished through a state supreme court decision, just rendered, sustaining a city ordinance controlling the licensing of the buses. A number of arrests have been made under the policy of the city council of Seattle, which is to prevent the buses from using routes competing with the car lines.

### Motor Bus Express Is Plan for Toll Highway

CHICAGO, Sept. 7.—Alfred E. Case, head of the brokerage firm of Case, Boyd & Co. of this city is having plans drawn for a private toll highway between Chicago and Milwaukee, the road to be 200 ft. wide and to be laid in six one-way traffic sections. The base of the roadway is to be of concrete with asphalt surface, if built as planned. Branch roads leading to the lake regions of Wisconsin are to be part of the system.

Two of the six sections planned are to be for motor bus express; two to be operated as toll lines for private passenger cars and two as freight roads.

## ✓✓ Buses Displace Trolleys in Des Moines

### Traction Company Unable to Operate on 5-Cent Fare—75 Buses Running

DES MOINES, IOWA, Sept. 3.—A complete system of bus transportation is now functioning in this city as a result of the recent suspension of the street car service by order of Federal Judge Wade at the request of the receiver of the traction company and bondholders.

The service suspension is the culmination of a controversy of several years, street car company officers declaring the present situation is the direct result of the inability of the company to operate under a 5-cent franchise without bus competition and under an 8-cent fare with unrestricted bus competition.

Judge Wade declared in his order that the property could not be operated longer without financial prejudice to bondholders and creditors, and it must therefore be sold to satisfy bonded and general debts.

It is stated that about 75 buses are in operation.

### Connecticut Buses Go West

HARTFORD, CONN., Sept. 4.—During the past week, it is estimated, fully fifty of the large motor buses, formerly used on local routes, have left Connecticut for Des Moines, Iowa, the trip being made overland. It is reported there is a big demand in the western city for this means of transportation and that vehicles formerly used in Connecticut have been sold or leased to Iowa interests. Practically all of the buses are being operated overland. Some of the owners plan to remain West for at least this winter, although some plan to return and take their chances in the East.

### Gas Sales Will Help Pay for State Highways

PHILADELPHIA, Sept. 1.—Beginning Sept. 1, Pennsylvania motorists must pay 1 cent a gallon for the State tax on gasoline, as this tax is to be shouldered by the consumer. Gasoline station managers have been instructed to keep an accurate account of all sales and make prompt return to the State authorities. Gasoline is now selling in this city at 23 and 24 cents. The tax is to be added to the ordinary price.

Failure to make monthly returns to the Department of the State Auditor, General, or refusal to permit employees of that department to examine a dealer's books, subjects him to \$1,000 fine, or six months' imprisonment, or both. Agents of the State who violate the confidential nature of such information are subject to similar penalties.

One-half of the proceeds of the tax goes to the county in which the tariff is collected, to be used solely for construction.



## New Use for Trucks in Oil Fields

### Latest Use Is for Pulling Out Casing from Oil Well Holes in California

BAKERSFIELD, CAL., Sept. 6.—Motor trucks have become an integral part of the system of distribution in the oil industry, and are as indispensable as the pipe lines and the tanks. Lately they have invaded a new section of the oil production field, as well as its distribution side. This has developed here in the work of the General Petroleum Co., which has been experimenting for some time with the use of motor trucks as portable plants for the pulling out of casing from the oil well holes. As a result, the company has equipped nine of its fleet of thirty-nine trucks for this purpose.

The constant pumping of an oil well causes the drawing in of the fine and heavy "oil sand" between the well casing and the pump casing. As the amount of this sand in this space increases, the production of the well decreases. Consequently, unless the pump casing is lifted out at fairly regular periods and cleaned of this sand, the well soon will become clogged and stop production. These nine trucks, with their crews, are devoted to this work, moving constantly from well to well, settling down on location and using the engine, connected by chain drive with an ingeniously-contrived windlass seated on the rear of the truck, to pull the casing.

The pumping rods and the tubing have to be pulled and then the bailer is run to clean out the sand. The truck does all this with one setting up, and does it much more expeditiously than it ever has been done before, saving time in the operation, as well as costs of fuel for power when the work was done by steam, and for the extra labor needed when steam was used. Other companies in the field are following the lead of the General Petroleum Co. in this use of trucks.

### Steamship Co. Operates Trucks

NORWICH, CONN., Sept. 8.—Through the operation of a fleet of motor trucks from their local docks, the Norwich-New York Steamship Line is substantially increasing its cargoes and making a strong bid for manufacturers' shipments from the so-called "mill belt" of southern New England. The trucks are not only used in collecting freight from mills throughout this territory but assure a prompt and safe system.

Special attention is being paid to plants that, because of limited output or other reasons, do not maintain an individual trucking system. Trucks now cover not only territory in this immediate territory but run to the manufacturing area in Versailles, Jewett City and Willimantic. Because of the motor truck service, many plants formerly us-

### Lord Northcliffe Praises British Motor Bus; Calls U. S. Slow

WASHINGTON, Sept. 2.—Lord Northcliffe, the eminent British publisher, who is now on a tour of the world, is a warm friend of the motor bus. In an interview while he was in this city he declared he could not understand why Americans had been so slow to grasp the possibilities of this form of transportation. He stated that in this respect American cities were lagging far behind those of Europe where motor bus transportation had been brought up to a high standard. He pointed out that in London, during the rush hours, motor buses provide practically incessant and ideal service.

ing railroad service are now turning to the water routes, especially in handling of small or odd lot shipments. Success of the plan and indicated future, officials of the steamship line intimate, means that more trucks will be used and the area covered enlarged.

Steamship men say that use of the motor trucks bears the same relationship to their freight service as do the spur tracks and sidings to service of the railroad lines. Low water-route rates with truck transportation between docks and factory are expected to get for the steamship lines a considerable part of the business handled in the past by the railroads.

### New Heavy Duty Trailer

DETROIT, Sept. 2.—Detroit Trailer Co. has brought out a heavy duty semi-trailer capable of carrying a load of 50 tons, which it is now preparing to go into production on. The semi-trailer has been given a thorough trial and found fully practicable for the work designed. Several orders for first production were placed following the trial.

The semi-trailer departs from the conventional in that it has four wheels in line instead of two. This gives it a total tire surface of 48 in. and permits a load disposition of about 800 lb. per square inch. Each of the four wheels are mounted on special Mansfield axles with radius rods on ball joints. Double spring action is provided.

Specifications of the semi-trailer in addition to Mansfield axles and steel frames, call for Timken bearings and Detroit springs. List price has been fixed at \$2,750. Through the use of the four wheels to carry the load, the trailer overcomes overloading legislation.

### Plant Will Turn Out Trucks

TORONTO, Sept. 2.—International Harvester Co. of Canada, Ltd., has announced its wagon and sleigh plant at Chatham, Ont., is being equipped to take over the manufacture of International motor trucks. These trucks have hitherto been made in the United States.

## Ford Prices Lowered Third Time

### 1-Ton Truck Reduced to \$445 —Roadster Is Now \$325 —Other Price Changes

DETROIT, Sept. 2.—The third reduction in Ford prices in the past 12 months now places the Ford at the lowest price in its history, being under the prices for which it sold before the war. Under the new schedule, the 1-ton truck sells for \$445 as against the former price of \$495. The passenger car chassis sells for \$295, compared with \$345, the former price. The chassis with demountable wheels and self-starter costs \$390.

NEW YORK CITY, Sept. 7.—The following reductions have recently been made in truck prices:

Make	Capacity, Tons	Old Price	New Price
Chevrolet	1	\$820	\$745
Noble	1 1/2	1,225	1,125
	2	2,585	2,400
	2 1/2	2,825	2,675
	3 1/2	3,150	2,950
Olds-Economy	1	1,030	3,800
	1 (Chassis with cab)	1,325	1,175
	1 (Chassis with express body and top)	1,395	1,245
Atlas	1	1,765	1,550
Lausden	1 1/2 (Chainless drive)	1,950	1,400
	3/4 (Chainless drive)	2,200	1,600
	1 (Chainless drive)	2,350	1,850
	2 (Chainless drive)	2,750	2,250
Lausden	1 (Chain drive)	2,350	1,850
	1 (Chain drive)	2,750	2,250
	3/4 (Chain drive)	3,650	2,350
	5 (Chain drive)	4,150	3,350
Harvey	3 1/2	4,300	3,950
	5	5,200	4,500

### Associations May Amalgamate

NEW YORK CITY, Sept. 9.—The National Association of Commercial Haulers will hold a conference in Buffalo on the fifteenth of this month. It is reported that steps will be taken at the conference to lay plans for an amalgamation between the Commercial Haulers and the National Team and Motor Truck Owners Assn. John Coughlin, a vice-president of the haulers' association and a member of the New York Van Owners Assn., will probably represent the commercial haulers. Joseph X. Galvin, president of the National Team and Motor Truck Owners Assn., will be the spokesman for that body.

### Schools Purchase Many Trucks

SPRINGFIELD, OHIO, Sept. 2.—Orders for the Springfield light motor truck, manufactured here by the International Harvester Co., are being received from various parts of the United States and also from foreign countries.

The demand for the high speed trucks is mainly from the cities and the rural school boards. Only a small amount of the business is coming from the farmers. It is stated that the farmers are unable to purchase trucks owing to the slump in farm products.



## Companies Against Theft Coverage

### Heavy Losses Through Pilferage Cause of Reduction in Item on Truck Policies

NEW YORK CITY, Sept. 9.—The insurance of goods on trucks in transit between cities has developed some interesting features. The volume of business has shown marked increase, but certain of the hazards have shown such high loss ratios that companies decline to take full coverage of all risks. This is notably the case with the theft and pilferage risks on trucks running between New York City and Philadelphia, and the experience there has been exceptionally bad.

One company, it is stated, undertook to write fire, collision, upset, theft and pilferage at 11 cents for \$100 of liability per trip. On this they received theft and pilferage losses to the amount of \$120,000 in six weeks and then stopped writing the theft and pilferage hazards. These losses included two losses of \$40,000 each within one week. The companies are still writing fire, collision and overturn risks at 7½ cents per \$100 of liability for the trip and are apparently making money, as the experience thus far has been good. But since the one company's experience in the theft and pilferage hazards became known none of the companies are desirous of issuing full coverage policies.

### Tri-State Road System Under Consideration

SAN FRANCISCO, CAL., Sept. 2.—A movement to unite southern Oregon, northern California and northern Nevada in a road system which shall give a northern inlet from the East to Portland and San Francisco, is well under way in the three states, but has been advanced so quietly that few except the promoters of the plan and the officials of the states mentioned knew anything about it. The principal mover in the project is the Northern California Counties Assn., which has interested the governors of Oregon, Nevada and California, the good roads organizations of those states, the automotive trades associations of all three, and the Northern California Supervisors' Association.

A co-operative plan of gradual road-building and development work, with Klamath Falls, Oregon, Winnemucca and Reno, Nevada, and Alturas, Ager and Susanville, California, as the centers, is well under way. The road programme will be completed, with all maps, surveys and estimates, and presented to the annual joint meeting of the Northern California Counties Association, and the Northern California Supervisors' Association to be held at Alturas, Cal., Sept. 15. Special invitations have been extended to the governors of Oregon, Nevada and California, to attend this meeting, while the

### Wayside Telephones Plan for Highways in Pennsylvania

POTTSVILLE, PA., Sept. 5.—A wayside system of telephones, whereby motorists en route can call up their homes on all State roads, and also call for help if a breakdown occurs are being installed in Schuylkill County.

This system has great possibilities for development as it provides for wayside tools in boxes for emergency purposes.

civic bodies of all the counties in the sections to be affected by the road, will send delegates. The automotive trades and good roads associations have promised to be at this meeting.

### Takes Over Haulage Problems of Baking Company

SAN FRANCISCO, CAL., Sept. 3.—Dan E. Hoffman, one of the largest truck owners in the West and who now operates more than sixty, has added a fleet of twelve Garfords. Hoffman does general hauling for many large firms. The new trucks added consist of nine 1½-tonners, two ¾-tonners, and one 3½-tonner. All of them will be used in the distribution of bread for the Langendorff Baking Co., San Francisco. They will replace fourteen trucks formerly operated by the baking company as owner.

Long continued experiments convinced the baking company that it should confine its attentions to the production of bread, and leave the operation of transportation fleets to men experienced in that line.

### Uniform Loading in California

SACRAMENTO, CAL., Sept. 2.—Co-operative effort on the part of the counties of California is to be attempted in getting uniform regulation for the loading of motor trucks. Following the failure of the bill at the State Legislature last winter, when the factions concerned could not agree on the load limit, the supervisors of San Bernardino, Riverside and Orange counties have drafted an ordinance, which they are asking other counties to adopt.

This would limit truck loads to 22,000 lbs. and 36,000 lbs. for truck and trailer; and providing also that not more than 50 per cent of the manufacturer's load rating be permitted.

### Coming Events

1921

- Sept. 9-17, Ottawa, Ont., Motor Truck Show, Howick Hall.
- Sept. 28-30, New York City, Electrical Show, 71st Regiment Armory.
- Sept. 2 weeks, Topeka, Kan., Truck Show at Motor Hall at Fair Grounds.
- October 12-14—Chicago, Annual Convention of the National Implement and Vehicle Assn. H. J. Samiet, Sec'y., 72 West Adams St.
- Oct. 24-29, Oakland, Cal., Annual Convention International Traffic Officers' Assn., Municipal Auditorium.

## To Rebuild Trucks in Atlanta Plant

### Separate Units Will Handle All Makes of Vehicles in Five-Story Building

ATLANTA, Sept. 3.—With a capital stock of \$2,000,000 and headed by Walter T. Candler, vice-president of the Central Bank & Trust Corp., the Lullwater Co. has been organized and incorporated to establish a motor vehicle industrial institute in Atlanta. Lionel J. Kahn, well known in automotive circles, has been named general manager of the corporation. Several prominent business men are connected with it as original incorporators.

The purpose of the company is to assemble under a single roof separate and individual industrial units of every kind connected with the automotive business. The idea is to make it possible to rebuild an automobile or a truck in this plant, or to repair any automobile or truck regardless of make. This plant will include complete paint shops, trimming and upholstering department, a silver and nickel plating department, and departments, each separate, for welding, boring, grinding, etc. In addition, the institute will accommodate tire, battery, accessory and novelty dealers, and there will be a general parts department that will stock parts of every standard make of automobile in use in the southern States.

The new company has leased from Walter T. Candler one of the largest automobile buildings in Atlanta, which is located on Auto Row and provides 114,000 sq. ft. of floor space. The building is five stories in height and preparations are under way to get the institute into operation as soon as possible.

### Royal Rex Truck Has New Shipment Plan

CHICAGO, Sept. 5.—The Royal Rex Motors Co., Chicago, building motor trucks and motor buses, is featuring a new departure in truck shipments between the factory and dealers. The outstanding feature is the shipment of trucks in boxes and cases instead of total units. By the use of this method the transportation charges are very materially reduced, and the shipments are arranged and packed in such a way that the truck can be assembled at the point of destination with a minimum amount of time and labor.

The truck is assembled from standard units but aside from the shipping feature there are several other up-to-date features. The chassis are in 1, 1½, 2, 2½, 3½ and 5-ton capacity. The intake air purifier for the purpose of eliminating dust is one of the engineering points. The frame is assembled without rivets, has no holes in the top web of the side rails and has a sub-frame of wood. The engine is supported in a steel cradle which in turn has a three-point suspension.





THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice President      E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. O. Building  
239 West 39th Street, New York

CONTENTS

Vol. XXV, No. 5      October 1, 1921

LEADING ARTICLES

Entire Control of a Big Fleet..... 7  
They Can Pull Together..... 10  
Trucks on Rails..... 12

MISCELLANEOUS ARTICLES

How Uncle Sam Cuts Costs..... 14  
Shuler Brings Out Front Wheel Truck Brake..... 18  
Systems Are Like Clothes..... 19

DEPARTMENTS

Your Midwest Engine ..... 16  
The Better Way..... 20  
Buyer's Department:  
    Spring Suspension a Feature of New Mack Bus 24  
    Lansden Electric Enters Speed Truck Field.... 25  
    Truck Accessories..... 26  
    Shop Equipment for Fleet Owners..... 28  
    Ample Ground Clearance Given with Hough  
        Mechanical Hoist..... 30  
Motor Truck Electric System Wiring Diagrams.... 31  
The Fleet Owners' Forum..... 32  
Editorial: The Driver and the Public..... 34

NEWS

To Reorganize P. O. Transportation..... 35  
Ten States Add Fuel Tax..... 35  
6 Mo. Test to Settle Bus Controversy..... 36  
Motor Bus Hit Hard in Indianapolis..... 36  
New Firm Will Sell Reimported Trucks..... 37  
Aim to Cut Cost of Assembled Trucks..... 37  
Shippers Protective League Formed..... 38  
Trucks Boom Farms in California..... 38

Index to Advertisers.....78-79

The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT  
David Beecroft, Directing Editor  
Sinclair Gluck, Managing Editor  
F. Eugene Spooner, Technical Editor

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

BRANCH OFFICES

Chicago, Mallers Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

SUBSCRIPTION RATES

United States .....\$2.00 per year  
Extra Postage west of the Mississippi River on account  
of Zone Postage Law .....50c  
Canada .....\$3.00 per year  
Foreign Countries .....\$4.00 per year

ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



There is no  
Substitute -  
FOR

Wyman  
Gordon  
Quality  
and  
Service

WYMAN · GORDON  
The CRANKSHAFT MAKERS  
WORCESTER, MASS.      CHICAGO, ILL.      CLEVELAND, OHIO

## *Are You Operating Enough Trucks to Warrant a Regrinding Equipment?*

That is a question each man might answer for himself.

Regrinding the engine of a truck practically redoubles the life of the truck. A reground motor, that is, a motor with reground cylinders, new pistons, piston pins, reground crankshaft bearings and reground valves is equal in every way to a new motor just out of the factory. With a fleet of trucks it wouldn't take long, with the savings due to regrinding, to pay for the equipment for doing the work. Figure it out yourself. Consider the average life of a truck and what it means to have that life doubled at the very small expense of renewing the engine by regrinding. Two machines would be required—a cylinder regrinding machine and a

### **Norton Autopart Regrinding Machine**

which grinds the pistons, piston pins, crankshaft and valves. The Norton machine will do all of the cylindrical grinding.

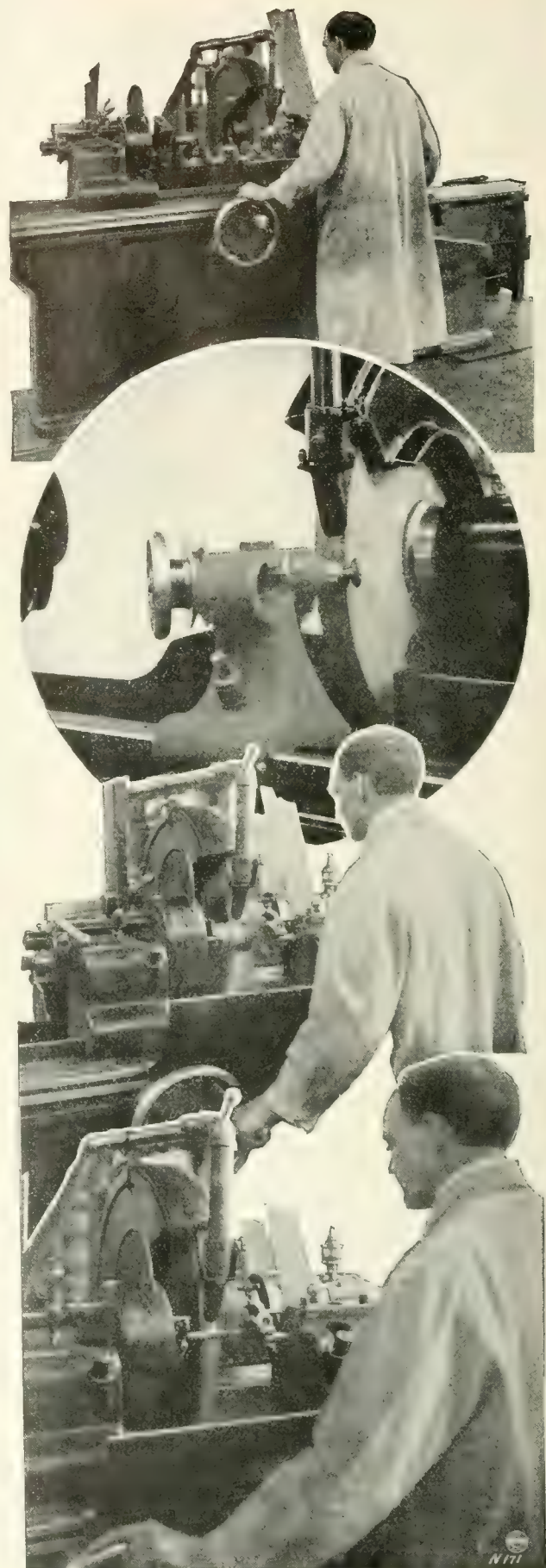
Here is an important matter for the consideration of every owner of a fleet of trucks. This machine will soon pay for itself.

### **NORTON COMPANY**

**Worcester, Mass.**

NEW YORK  
151 Chambers St.  
CLEVELAND  
442 Engineers' Bldg.  
PITTSBURGH  
608 Empire Bldg.  
CHICAGO  
11 No. Jefferson St.  
HARTFORD  
49 Pearl St.

INDIANAPOLIS  
304 Pennway Bldg  
DETROIT  
233 W. Congress St.  
SYRACUSE  
206 Keith Theatre Bldg.  
PHILADELPHIA  
324 Bulletin Bldg.





# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Vol. XXV

Oct. 1, 1921

No. 5

## Entire Control of a Big Fleet

*What Experience Taught the Superintendent*

**This Is His Own Story!**

“**C**ONSIDERING all the problems that arise from time to time in the operating and maintenance of a fleet of motor trucks, we find that it is something of a task to overcome them all in a satisfactory manner.

“A great many fleets of trucks have been kept on the down and out list—and manufacturers have often suffered unjust criticism—just because the fleet owner has failed to install the proper system of management. Moreover, this same lack of the proper system of supervision has cost more than one fleet owner many thousands of dollars.

“I firmly believe that there is not a fleet of motor trucks which could not be placed upon a paying basis, *provided they are properly selected as to type and capacity, in the first place.* But the first thing for the prospective fleet owner to consider is the type and capacity of truck best adapted to the special kind of work which the trucks are to do. Just any truck won't do, even if it is the best on the market, unless it is the economical type and capacity for the work in hand.

“Once the proper trucks have been selected, the next consideration is how those trucks are to be operated so that they will realize reasonable return for the money invested in them. This sounds obvious. But there is far too little consideration given to just this question of economical and efficient operation. What is more, it is a big problem; and the only way to solve it is for the fleet superintendent to get down to brass tacks and study his own conditions, under which he has to operate his trucks.

“It is a very necessary education for the fleet superintendent to know the systems under which other fleets are being operated. But there are always cer-

tain conditions which make it unwise or impossible to operate one fleet of trucks under exactly the same system as another. For this reason, the superintendent should always study his own conditions and arrive at a system of his own.

“The writer has the entire control of the operating and maintenance of a fleet of sixty-five trucks belonging to the Geo. B. Newton Coal Co. of Philadelphia.



*This is A. D. Aldrich, superintendent of the big coal truck fleet of the Geo. B. Newton Coal Co. and the author of this article*

This article is an attempt to make clear the details of the system he has installed for the successful operation of these coal trucks.

“The fleet consists of thirty 3-ton United States trucks, two 5-ton United States trucks, thirty-one Autocars, one 2-ton Mack and one 1-ton Smith Form A truck. The last two are supply trucks,

delivering supplies to the various yards and do not haul coal at all. One of the Autocars is equipped with a service body and is used for service only.

“These are the more important items to consider in the operation of a fleet of trucks: Garaging the trucks, drivers, shop facilities, repair parts stock, and last but not least, the performance and cost records system.

“Our garage is a one-story brick building, 100 ft. wide and 130 ft. deep, located as nearly as possible centrally to the different yards. This garage contains the repair shop, stock-room and superintendent's office. All the trucks are garaged here except fourteen which work at yards too far from the garage to make it economical to have them come in that distance. These latter are stored at the yard or at public garages nearby, although we take care of all street service, inspection and repairs from our own garage.

“As to our drivers, we always try to select men who are most fitted to drive coal trucks and at the same time men who can handle coal to advantage, for a lot of time is lost during a day's work if your men do not know the short cuts to chuting coal into cellars. Many of our oldest drivers once drove our teams. These are men whom we thought worthy of the time spent in teaching them to drive trucks and to care for them in the right way.

“It is our experience that green men make the best truck drivers. We take these men and teach them the proper way to drive and care for trucks and they have nothing to unlearn.

“We do not allow drivers to carry any tools whatever, not even an extra spark plug, in their tool boxes. Instead, we instruct them to look after their truck in general and to watch out for defects. Then, if a strange noise develops, the driver 'phones the garage and we send a mechanic to the truck to make the repair



## There Is a Lesson in This Article for Every Superintendent. Read It!

on the spot. In cases where the truck actually breaks down, we send another truck to the driver in exchange for the broken one and he finishes the day with the extra truck. We always try to have an extra truck of each size in the garage for this purpose.

"When we hire a driver he is assigned to a certain truck and no other driver is allowed to drive that truck. Then we hold the driver responsible for the oiling and the general condition of his truck at all times.

"All of our larger trucks are equipped with governors which are set and sealed with our own seals and we consider it a very serious offense for a driver to tamper with his governor in any way or not to report it when the governor is out of order or does not work properly. In fact we do not hesitate to discharge drivers for this offense. We have a weekly inspection of all governors and change any which are not working properly, as we carry several service governors for this purpose.

"We thoroughly impress on the minds of the drivers the necessity of reporting to the superintendent any repairs needed on his truck. This is done when he returns to the garage at night. Such repairs are taken care of by the mechanic who is on duty all night and who takes care of small adjustments.

"Each evening we repay the drivers any money that they have spent during the day for telephone calls and commend them for catching their trouble and reporting it before it has done any serious damage.

### Frequent Talks with Drivers

"We often get the drivers together in the chauffeurs' room for a little chat and encourage each one of them to tell his troubles or funny incidents that have occurred during the course of the day's work, and also to make any suggestions which may occur to them.

"It is surprising to find the good that a superintendent can get from a bunch of men in this way and at the same time this system gives the superintendent an opportunity to bring up any little thing or condition which he wishes to correct.

"Our drivers are given four cash prizes each month, one for each size truck, for the four best averages of miles per gallon of gasoline used during the previous month.

"There is a bulletin board in the chauffeurs' room on which we post at the end of every month the number of tons each driver hauls, the number of miles he drove, the number of hours he worked and the average miles per gallon of gasoline he used.

"The sheets for the previous month are

also left on the bulletin board so the drivers can see if they have fallen behind or have improved. It is surprising to see the interest they take when the new sheets are posted.

### Give Drivers Responsibility

"We find that placing all the responsibility possible on each driver makes him realize more fully the importance of giving his truck the proper care, and each driver tries to make his truck look a little better than any other truck in the fleet, which is the spirit that makes repair bills low and keeps the trucks on the street.

"We try to take every possible interest in our drivers and mechanics. Besides the gasoline mileage prizes we give them free medical attention by our doctor and also a free life insurance policy. The Newton Coal Co. publishes a monthly magazine called the "Newton Messenger," giving the news of all the yards to each of the employees. It also prints employees' photographs when they have made any kind of a record in their work or have done anything unusual for the benefit of the firm or its employees.

"Our shop is equipped with enough machinery so that we do not have to send anything outside for repairs except our cylinder and crankshaft regrinding jobs. We have our own welding and cutting torches.

"When a truck comes into our shop for repairs, the clerk in the office stamps the time the truck comes in on a specially printed form of our own. He then goes back to the shop and is informed by the shop foreman of the nature of the repairs and the length of time it will take to complete them.

"The clerk then calls the yard where the truck was working and states that this truck is in the shop and will be there for a certain length of time, or that the driver is leaving the garage for the yard with another truck. It all depends on the length of time estimated for the repair as to whether the driver waits on his truck or takes out an extra truck to finish the day. But if the driver waits on his truck, he does not sit in the chauffeurs' room and sleep but gets his piece of waste out of his tool box and wipes up his engine or gets his oil can and oils all the cups on the truck. We furnish our drivers with clean waste at all times to carry in their tool boxes, along with their oil cans, which together complete their kits of tools.

"We also have a time clock in the shop and each mechanic has a weekly card on which he rings in in the morning, out at noon, in at noon, and out in the evening. This is a white card. Then we have a

pink card which is a job card. When a mechanic starts to work in the morning he rings in on the pink card the same as the white card. Then he is assigned to a job and the foreman fills in the pink card, charging the time shown on the card to the truck on which the mechanic is working.

"If, at any time during the day, the mechanic is given another truck to work on, he rings out on the pink card and at the same time rings in on another pink card. These cards are kept in a box at the side of the time clock. The pink card shows the mechanic's name, clock number and the time on and off a job, on one side. On the other side it shows the description of the work he did.

"Each mechanic must have a pink card for each and every truck on which he works during the day and which shows the exact minute that he started and finished each job. And each mechanic must have enough pink cards properly punched so that, when added together, they correspond with the time punched on his white card, from which his payroll is figured. By checking off these cards we know that every hour for which we pay the mechanic is properly charged up to one of the trucks instead of to the shop or to overhead.

### The Shop Repair Card

"We also have a form known as the shop repair card which is made out in duplicate by the foreman. This shows the repairs necessary on the truck. The duplicate is of cardboard and is placed in a leather envelope with a celluloid face, which is attached to the truck to be repaired. If the mechanic assigned to the truck notices that any other repair is necessary he calls the foreman's attention to it. The foreman then adds this item to the card, if he considers the repair necessary, and the mechanic goes ahead and does the work.

"After the work is completed it is inspected either by the foreman or by the inspector and if O. K'd, the front office is immediately notified that this truck is out of the shop and ready for service. The duplicate repair card is then filed in the shop foreman's desk for his information and the original is turned into the office each morning for the day previous. The contents of this card are posted on a card index form showing the repairs that were made and the mechanic that made the repairs. By these index cards we are able to tell at any time any repairs which were to be done on any of the trucks and the man or men who did them.

"Our trucks are called into the shop once every thirty days, whether the truck is in trouble or not, and carefully looked



over by the inspector. He then fills out one of our own inspection sheets which includes everything, even the general appearance of the truck. This done the sheet is filed in the office under the truck number. By this method, we are able to tell the exact condition of each one of our trucks at any time.

"Each of our mechanics is supplied with ten brass tool checks with his clock number stamped on them. These he uses to draw tools from the stock room. These tools are returned to the stockroom every night whether the job is finished or not.

"We have a blacksmith shop and body shop located close to the garage, where we not only repair our bodies, but built all our new bodies as well as wagons. The blacksmith shop is equipped with a 500-pound steam hammer. This enables us to do any kind of heavy repair work on our hoists. Each of our trucks is equipped with a mechanical hoist driven from the engine which elevates the body to a height of 9 ft. 1 in. in front and 7 ft. 2 in. in the back.

"In our stockroom we have from \$25,000 to \$30,000 worth of parts and units. This seems like an enormous amount of money to have tied up in parts but this is one of the ways that we save time and money on our fleet. We do not depend on service stations for our parts, as we purchase all of our parts direct from the truck manufacturer and by the perpetual inventory which we keep, it is seldom that a truck is held up in the shop waiting for parts.

### Unit Repair System Also

"By our units, which consist of spare engines, transmissions, front and rear axle assemblies, steering gear assemblies, fans, water pumps, wheels, springs, and radiators, together with our large stock of small parts, we are able to turn out a completely rebuilt truck in a comparatively short time. Or we can replace an engine and have the truck on the street in 8 hours, or replace a transmission in 3 hours. This is a mighty big saving, but it is one that is often overlooked by fleet owners.

"Our stockroom is arranged so that each part has a separate bin properly tagged with the part number and price. When a mechanic wants a part he goes to the stockroom window for it. The stockroom man makes out one of our own requisition forms and the mechanic takes the old part and the requisition to the foreman. The latter examines the part and if it requires replacing he signs the requisition. The mechanic then takes the old part to the stockroom together with the requisition and receives the new part. The old part is then put in the scrap bin. By this method we are reasonably sure that no parts are scrapped which have not first been inspected.

"If a stock of parts gets low, the part name and number is put on an order sheet which is turned into the superintendent's office for repurchasing. The superintendent buys nearly all the material used at the garage. The garage office gets an order number from the

main office, issues a memorandum order on our form and sends it to the manufacturer of the part. Then another order form is made out in duplicate and the original is sent to the main office and the duplicate filed in the garage office. The main office then makes the order out on our regular order form and mails it to the manufacturer as a confirmation order.

"All material is received at the stockroom. Every morning the receiving slips of any material received the day before are turned into the office. The clerk then makes out on our own form, in duplicate, the items received, from whom they are received and the order number. The original is sent to the main office and the duplicate filed at the garage. The main office uses this purchase receipt to check the invoice as to quantity and extensions. Then the invoice is sent to the garage to have the prices checked and O. K'd.

### This Superintendent Says:

"A great many fleets of trucks have been kept on the down and out list . . . just because the fleet owner has failed to install the proper system of management.

"There is not a fleet of trucks which could not be placed upon a paying basis, provided—"

### But Read the Story!

"All of our operating and expense records are kept in the garage office and posted on a large form sheet every day. At the end of a month this sheet is turned into the main office. We use one sheet for each truck every month. This sheet is of a large size and has separate columns for the following items, posted daily: The yard where the truck worked each day, number of tons delivered, mileage, gallons of gasoline used and cost of same, pints of oil used and cost of same, drivers' wages, hours out for repairs, hours working, shop labor and material, outside labor and material (which consists of all labor and material used at the blacksmith shop, body shop, or paintshop), tires, garage and service, fixed charges, cost per ton delivered, and cost per mile hauled. The last four columns are filled in and figured at the main office, as they include overhead charges which we do not have at the garage.

"The items posted in the large sheet are received from the following places: The yard worked at, mileage, fuel and oil and hours worked are taken from the routing sheet in the office; the tons hauled are taken from the daily service slips that the drivers turn in each evening from the yards; the driver cost is taken from the number of hours he works, the shop labor is taken from the job time cards in the shop which are turned into the office every morning from

the previous day; and the materials used is taken from the stockroom requisitions which are turned in every morning from the previous day properly priced and charged to the truck that used the part. From these sheets we can learn at a glance any information on any truck for any day or any one month.

### Checking the Driver's Work

"The routing of drivers for the yards is handled in the following manner. The office clerk 'phones each yard and learns the number and size of trucks required for the next day. He then makes out on one of our form sheets known as the routing sheet, the truck number, driver's name and where the truck is to work the next day. This sheet also shows the time the truck left the garage, the time returned, the gasoline and oil used, and the hub odometer reading at the end of the day. The last three columns are filled in by the night man who takes care of all gasoline filling and oiling. This man has long hours, although after he gets the trucks filled his only duties are those of a watchman.

"We have two gasoline tanks which total a capacity of 1115 gallons. The gasoline is pumped from these tanks into a 50-gallon wheeled tank and the trucks are filled from the latter. All the drivers have to do in the morning is to fill their radiators with water and leave for the yards at half past six. As they leave the door they are timed out on the routing sheet by the night man.

"As the drivers arrive at the yards, they are timed in on their shipping sheet which has a column for each truck. The driver pulls on the scales for the shipper to get the unloaded weight of his truck. He is then instructed as to the kind of coal to load. After he gets the load he is weighed and given a slip in duplicate which tells him where the load is to be delivered, whether C. O. D. or charged and whether chuted in, carried in or wheeled. If carried or wheeled, the driver gets another man to help him.

### Check on Driver's Time

"As the truck leaves the scales the shipper marks the address where the load is going, the time, and whether chuted, carried or wheeled, on his shipping sheet. When the driver returns he turns in the original slip properly signed by the party who received the coal and is told what kind of coal to load next. The shipper also times the driver on his return.

"The shippers at the yard know their territory so well that they can readily estimate the length of time it would take to deliver a load of coal to any part of the territory and if a driver takes an unreasonable length of time for the delivery he is called on for an explanation. If this is not satisfactory the shipper reports the driver to the garage superintendent who is in a position to dispatch an inspector to any district to keep in touch with the movements of any given truck. But we are glad to say that we are seldom called on to send out inspectors to keep our men working.

(Continued on page 22)







shipments anywhere within its system on the day following their receipt by the company.

How this has been accomplished will be readily seen by a glance at the map which accompanies this article. It will be seen that Watertown and Burlington constitute the two chief rural terminals of the electric lines which center in Milwaukee. South and west of Burlington lies a prosperous country which includes the well known summer resort regions about Lake Geneva and Delavan Lake. Consequently, two routes were laid out which should reach both these sections, one terminating at Delavan, a thriving town not far from the lake of the same name and the other at Williams Bay on Lake Geneva.

These routes have been so deluged with business that two trips a day through the summer are necessary in the latter case, while the double schedule is maintained throughout most of the year on the other.

From Watertown, the other important rural terminal, three truck routes radiate, varying in length from 26 to 42 miles. One of them extends west to the state capital, Madison, while the others reach out to prosperous manufacturing centers to the north and south.

### A Sample Shipment

In actual operation the system works something like this: John Smith, a breeder of dairy animals living near Williams Bay, wishes to send a calf to a customer living near Madison. The animal is crated in the morning after being fed. The shipment is delivered at the office of the transportation company any time before noon. The calf is taken to Burlington that afternoon in the company's big truck and transferred to the electric system which delivers it early next morning at Watertown. Here the Madison truck picks it up and delivers it at its destination by mid-day. A shipment received at any point on the system before noon of one day is delivered to any other point on the system sometime the next day—usually by noon or before.

The total mileage of the truck routes is approximately 150 miles. Each of the three routes centering in Watertown requires the service of three trucks, one of which is held in reserve for emergencies and overflow traffic. The shorter routes which center in Burlington are served by two trucks each, one of which is held, likewise, in reserve.

Packard trucks with pneumatic tires constitute the units of the fleet. They are equipped with special bodies—both trucks and trailers being of the enclosed type. Ordinarily the trucks are loaded to capacity on the outbound trip and return with 40 or 50 per cent of a load. Anything and everything which it is possible to handle is accepted for transit.

### Good Winter Service

Some little doubt was expressed by patrons of the service as to whether it would be possible to maintain the service satisfactorily through the winter

months. No serious trouble in this regard has been experienced, although Wisconsin winters are severe and snow is often considerable. The big trucks have in fact kept the roads open through such periods better than has been the case before, and to this extent have proved to be an additional benefit to the communities through which they operate.

Another feature that deserves mention is the fact that bonds have been voted for improved roads in each section

which still leaves it necessary for us to go to the freight house."

### Farmers Enthusiastic

Although the big trucks do not make wayside collections or deliveries in the open country to any great extent, the farmers who live adjacent to the communities reached by this service have benefited very considerably. Much small farm produce starts to market in these



Two views of the road equipment with which the trolley line has extended its freight hauling business in urban and interurban districts. The first view shows a Packard hauling a four-wheel trailer. The second shows a large Packard. Note the giant pneumatics and the comfortable cabs with which the vehicles are equipped

where this interurban service is maintained. The need of better highways has become evident to everyone who has been benefited by the quicker and more dependable movement of freight and express through the region that is thus served.

Merchants doing business in the towns reached by the units of this traffic fleet are not backward in their praise of the advantages which have come to them in a business way.

"With deliveries standardized and service at regular hours every day it is possible for us to maintain our stocks in better shape," stated one of them. "Our 'turnover' is more rapid and regular. When we have special orders to fill for particular customers we can promise definite deliveries with but little risk of disappointment. The fact that shipments of considerable amount are delivered at our place of business is a vast improvement over freight service

big yellow trucks, for it has been learned that delivery in Milwaukee and at other points on the following morning is as certain, almost, as the rising of the sun. When this is not the case it is the result of shipments having been forwarded, through error, in the wrong direction, or accidents to equipment which were unavoidable. Such circumstances as these, however, are negligible in number.

All told, motor trucks have quite revolutionized the method of doing business throughout the seven Wisconsin counties in which "gas" power and electric power have been hooked together in the interest of public service.

The hostility, where it exists, between motor trucks and electric railroads is natural enough. But that does not make it always reasonable. For the two means of transportation can pull together and feed each other. And they can accomplish far more together than apart.



# Trucks on Rails!

## Limited but Important Field for This Type of Transport



IS there a field of usefulness in industry for the passenger bus on rails and the truck on rails? Will these vehicles, running on tracks, prove the solution of certain transportation problems now puzzling individual and municipal fleet owners? Present indications would seem to point that way.

At first glance, putting a motor truck on rails would seem a worse than useless experiment. The great advantage of trucks over railed transportation lies in the superior mobility of the former, and hence their ability to operate in and open up new fields of industrial transportation—fields which might not yet, or might never, justify the installation of expensive steel trucks. But while this advantage holds in most instances, there are certain cases in which it pays—and pays well—to operate trucks and buses on tracks, rather than on the ordinary open road.

### Now Rendering Service

Motor trucks, equipped with flanged wheels, are now rendering valuable service on various rail lines on the Pacific Coast. The city of San Francisco is operating ten of these vehicles over the Hetch Hetchy Railroad. They carry working crews, passengers and baggage. The

passenger cars, or buses, carry from 22 to 27 people each. Five of the trucks are Whites, two are Pierce Arrows, and there is a Cadillac, a Packard and a hybrid of several makes. One of the Whites is fitted up as an ambulance with a removable stretcher and another is equipped as a mail and express car.

### To Make Flanged Wheels

There is actually a considerable demand for the railway type passenger and express bus. In fact, this demand is so clearly discernible at the present time that the White Automobile Co. has installed a lathe in its plant for the purpose of turning out steel flanged wheels with which the vehicles are equipped.

Trucks manufactured by the Four Wheel Drive Auto Co. have also been adapted with success to this work, as some of the accompanying illustrations show. Some thirty-five men employed by the Cresson Consolidated Mining Co. ride to and from the mines in an FWD truck running on rails. The 3-ton FWD, which was formerly run over rough roads, has been equipped with flanged wheels and now transports the workers speedily and comfortably to the mines. The driver is protected in an all-weather cab. The run of this bus covers 4 miles.

An interesting development of this demand for buses on rails are the Whites

shown in the accompanying illustrations. The standard truck wheels have been removed and the front wheels have been replaced by a pony truck consisting of four steel-flanged wheels, each of which is equipped with a brake shoe.

This pony truck is constructed of high grade steel, each wheel being mounted on two ball bearings of ample dimensions. The bolster is suspended in such a manner as to relieve the greater part of the side thrust, in negotiating curves of short radius at high speed.

Three separate and distinct sets of brakes are provided, which makes for safety in operating the cars on the steep inclines. These brakes consist of the service brake, operated by a pedal and contracting on the rear wheels, the four brake shoes, operating one on each wheel of the pony truck, and emergency brakes, operated by a hand lever and expanding on drums on the rear wheels.

### Sand Boxes and Turntable

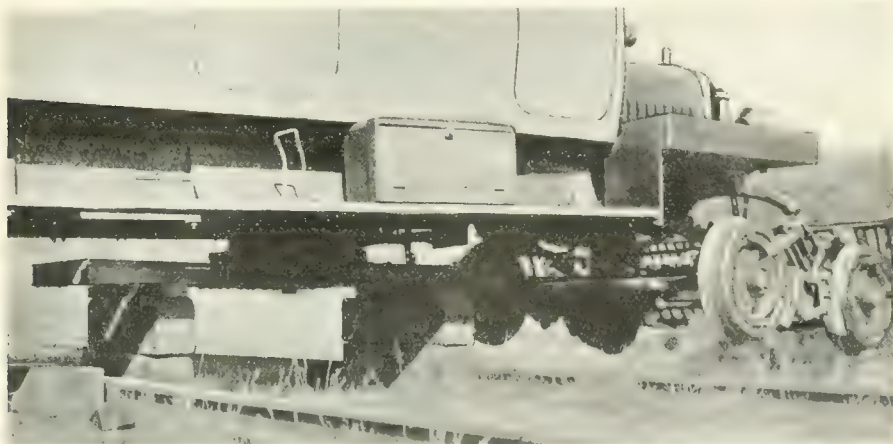
The cars are equipped with sand boxes as an additional safeguard. The sand is carried in steel tanks, which deliver the sand onto the rails in front of the rear wheels. An air pump, placed under the hood and connected up with the engine, provides compressed air which is used in forcing the sand onto the track in front of the rear wheels.

A novel feature of these cars is the fact that they are equipped with special apparatus for turning the car around within its own length, making a full-sized track turntable unnecessary. This device consists of a fifth wheel, mounted under the center of the truck, to which two heavy angle irons are attached. Jacks are placed beneath these bars and the entire car raised until it is clear of the tracks. It can then be readily swung about until it faces in the opposite direction. Chains are used to prevent too great expansion of the springs when the weight is removed from the wheels.

Some of the trucks are equipped with a body for hauling construction material.

### How Gasoline Is Supplied

Two 4000-gallon steel tanks have been buried at Groveland, in such a manner that gasoline can be delivered directly to them from tank cars. Oil pumps are housed in a special corrugated iron build-



How the bus or truck can be turned around to face the other way, without the use of the usual railroad turntable. Each bus and truck is equipped with a fifth wheel in the center of the chassis. This is jacked up as shown here and the vehicle turned. The illustration at the top of this page shows the lathe installed by the White Automobile Co. in its plant for the purpose of turning out steel flanged wheels for trucks and buses on rails



ing located near these tanks. This equipment provides the gasoline used in operating the passenger and freight speeders of the railroad.

The Hetch Hetchy railroad was constructed by the City of San Francisco for the purpose of transporting the 230,000 tons of construction equipment and material used in the Hetch Hetchy power and water project. The road is standard gage, 68 miles in length, extending eastward into the Sierras from Hetch Hetchy Junction. The road was built along a route that would not only involve a minimum of cost but would also be contiguous to all important points of the Hetch Hetchy Aqueduct. The railroad terminates at the Hetch Hetchy dam site. Most of the climb for eastward traffic, toward the dam site, is on a grade of from 3 to 4 per cent.

The passenger cars operated over the Hetch Hetchy railroad were utilized this summer for the purpose of taking tourists over the Hetch Hetchy project.

### Other Fields of Operation

This is just one example of how trucks can be used on rails to advantage. But there are others. In the western part of New York State there is a 57-mile railroad running north and south through an old settled region. As it does not lie in the direction of the country's commerce, there is no through business, but connections are made with trunk lines at each terminus. The road was built more than 50 years ago and like many other short lines went from bad to worse, until in 1917 the owners gave up operation rather than face the ever mounting costs.

This was a hard blow to the region. But in 1920 a group of local business men bought the road and put the two 50-ton locomotives and the track in shape for freight service. Now a train is run up one day and back the next, with an average load of 22 cars per trip. But the seven passenger stations have not been reopened. Present returns from passenger service would not warrant it.

This is a good example of the railroads that might well adopt service by gasoline-propelled vehicles over their tracks, as indeed several have done.

### Buses Would Solve Problem

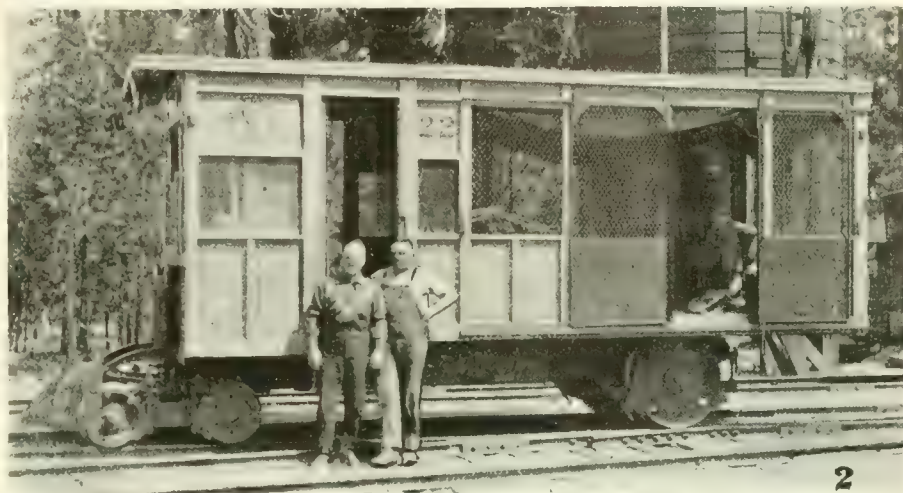
The population is there and they have the money to ride. The roadbed is there, too. All that is lacking is a low-priced, self-propelled car. Two gasoline cars on this line could make a round trip each day, affording speedy, comfortable service the year around, at such a cost that if there were only three passengers per trip they would pay the expenses, including amortization, in 3 years.

There are but 15 miles of improved highway parallel to the railroad mentioned, and for 6 or 7 months in the year the only way to reach the several communities is by wagon or sleigh.

There is no very extensive field for trucks and buses on tracks. But there are certain instances and conditions where they may well prove of great value to fleet owners and other transportation agencies.



1



2



3



4

1—Bus on rails operated by the City of San Francisco for carrying passengers and workmen to and from the Hetch Hetchy dam site. 2—Freight and equipment truck on same line. 3—Truck operated by a mining company for carrying workmen, passing over a viaduct. 4—Close-up view of the same vehicle. It would have been much more expensive to build a road



# How Uncle Sam Cuts Costs

## Labor Saving Yard Equipment Keeps Truck Wheels Turning and Reduces Trucking Costs

By Aaron Hardy Ulm

FOR the last three years the United States Government has been its own wholesale and retail coal dealer in Washington. Coal used by the departmental and bureau buildings of all kinds is purchased at the mines by the Bureau of Mines and delivered by the railroads at what is known as the Government fuel yards. Excepting that which is delivered direct in the cars to places of consumption,—as in the case of those places which have the benefit of sidings,—the coal is distributed through the District of Columbia by motor trucks.

Thus the experiment has been one in motor truck operation as well as in coal distribution. Accurate records have been kept on every item having to do with truck operation as well as other features. George S. Pope, as chief engineer, has directed the fuel yards since they were established during the peak of the coal scarcity in 1918.

### "Keep the Wheels Turning"

"There was never any debate among us about the advisability of using motor trucks for distributing the coal," he says. "But from the beginning, we realized that the best way to play safe with trucks and get best results from them is to keep their wheels turning around just as steadily as possible during working time.

"We found, for example, that to keep a 7½-ton truck idle five minutes during working time entailed an expense of 40 cents. Thus an hour's wasted time in making a delivery would add 50 cents to the average per ton cost of handling the coal delivered.

"The Government fuel yards are arranged and equipped largely with the view of keeping trucks, so far as possible, continuously on the move while under operation."

### Average Ton-mile Cost \$.19

The accounts of the Government fuel yards were checked up and analyzed recently by the United States Bureau of Efficiency. It found that the average per ton-mile cost of handling coal for the Government was 19 cents for the ten-months' period ending April 30, 1921. The larger the truck the less, of course,

the cost per ton-mile of handling the coal. The average for the largest, 7½-ton, was \$.164; for the 5½-ton it was \$.217; the 2½-ton, \$.324; the 1-ton, \$.207.

These costs do not include taxes and depreciation. It was estimated by the Bureau of Efficiency that those two items would have about doubled the figures.

During a period of nearly three years ending on April 30, this year, the Government fuel yards trucked a total of 534,019.26 tons of fuel, practically all coal. The average handling cost was \$.928 a



### Coal Dealer Economies!

This article describes how Uncle Sam has saved \$500,000 in the big government coal yards by installing the right kind of yard equipment to keep the truck wheels turning.

Perhaps individual coal dealers cannot install equipment on the same scale. But they can profit by the fruit of government experience to some extent.

Read this article carefully and compare Uncle Sam's trucking costs with your own.

The manager of the government yard has proved his theory—that extensive equipment pays.

Why not profit by:

### Uncle Sam's Good Example



ton, for that which was delivered by truck. That, so to speak, was the cost of the coal, thus delivered, over and above what was paid to the mine operators and, in freight, to the railroads. The figures include everything having to do with yard and truck operation but do not include interest on investment, depreciation or taxes. If those items had been added, says the Bureau of Efficiency,—that is to say if the fuel yards had been operated as a private commercial establishment—the cost of delivery at the curb would have been \$1.943 a ton for anthracite and \$1.886 per ton for bituminous coal.

For the entire period covered by the fuel yards' operations, the garage operation and expense,—that is the entire cost of trucking—averaged \$.568 a ton. The cost of yard operation and maintenance was \$.264 a ton, and general overhead entailed an expense of \$.096 a ton. Under private operation each of those figures necessarily would have been about doubled by taxes and depreciation.

The analysis made by the Bureau of Efficiency shows that the trucking system is the key to the chief economies achieved through pooling all of the Government's coal needs in Washington. With a big fleet of trucks under their direct control, the fuel yard managers have been able to maneuver deliveries along the most economical lines.

The advantage in big trucks, when their use is feasible, as is the case with most of the Government's deliveries, which generally are in large units, has been so evident, that the Bureau of Mines is now arranging for the addition of several 10- and 12-ton trucks to its fleet which, of all kinds, now numbers about twenty.

The trucks have been backed up by coal yard equipment that cost nearly \$500,000. It consists of giant cranes and overhead conveyers and big cement storage bins. Coal is unloaded from the railroad cars and on to the trucks either automatically or by machinery alone. The loading time for even the largest trucks averages less than five minutes and frequently is as short as a minute and a half. This prevents congestion of trucks at the yards.

### Equipment Cuts Costs

"If the experience at the Government fuel yards has taught anything of value about the retail distribution of fuel," Chief Engineer Pope said to the writer, "it is the advantage lying in large handling units. To handle coal cheaply you must have equipment that will save time and labor. That equipment is costly and thus entails a large investment which necessitates a large volume of business by the operating unit.

"While trucks are of course necessary, it is essential that they be backed up by yard equipment which will prevent costly delays occurring during operating time. We have found that the economies com-



ing from truck operations are governed very largely by the percentage of time their wheels are turning around when out of the garage. Keep the wheels turning, and they will pay handsomely. But to keep the wheels turning means that there must be as little delay as possible in loading and unloading, and in loading coal quickly on trucks you should have automatic equipment."

Those who have investigated the Government's coal distributing experiment estimated that the savings accomplished total about \$500,000 for the period covered. This was achieved through unifying the business. Some of it came, however, from the fact that the Bureau of Mines people being in direct touch with the coal mining world, and having in its personnel many coal specialists of all kinds, were able to buy to greater advantage than private dealers could.

### All Under One Bureau

Congress is now giving serious consideration to the suggestion that the buying and distributing of all the Government's coal, no matter where consumed, be put under the direction of the mines bureau. Most of the seven to eight million tons bought by the Government every year is procured from private coal dealers on bid, as was all the coal used by the Government in Washington before the Government fuel yards were established.

Some of the Bureau of Mines specialists declare that by thus unifying all buying and distributing, and applying to it the very best yard and trucking equipment, as has been done in Washington, even to twenty million dollars could be saved annually on Uncle Sam's fuel bill.

Coal people dispute some of the contentions made by the Government's specialists, who in turn say that the coal distributors can achieve economies similar to those which the Bureau of Mines has brought about in Washington. The specialists say that many coal distributors have done so.

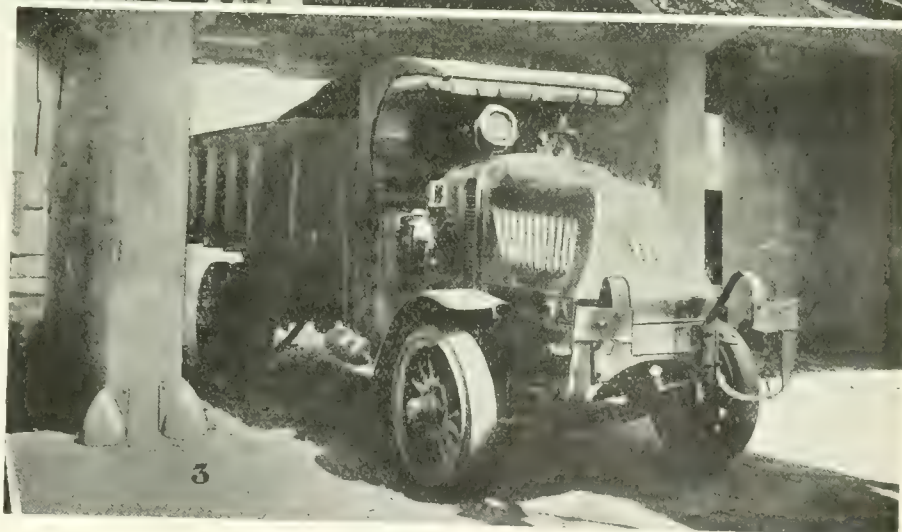
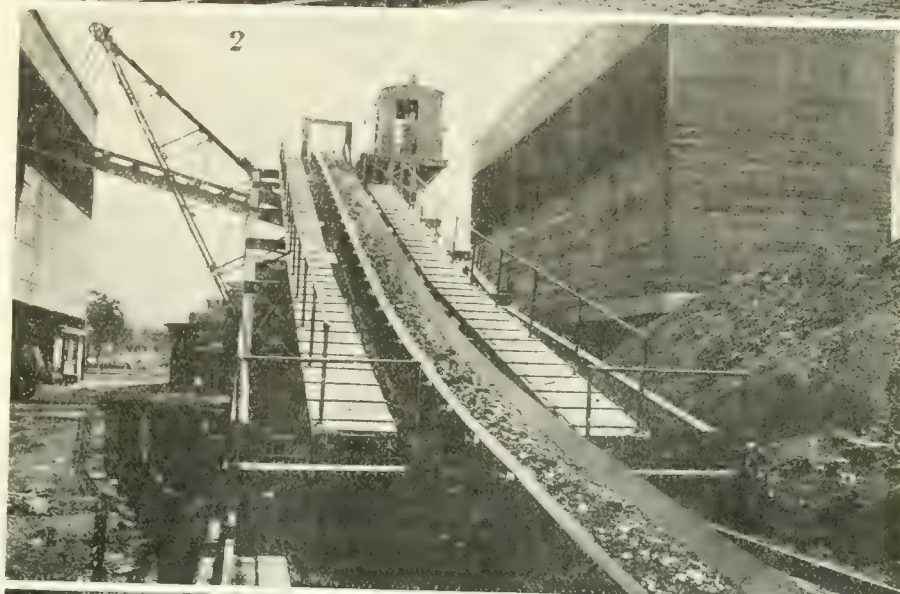
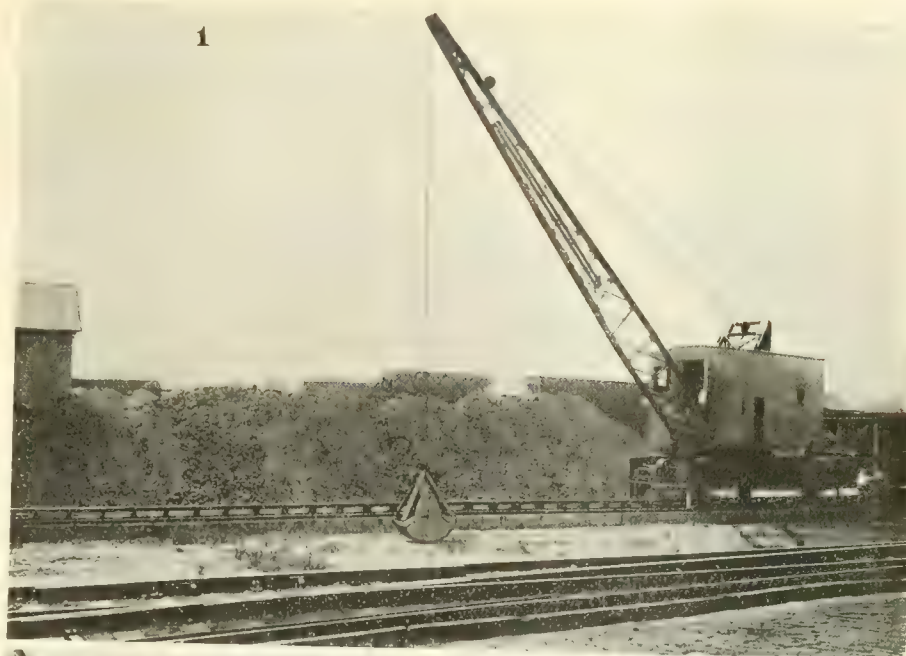
### Willard Produces an All-Rubber Storage Battery

CLEVELAND, Sept. 17.—The Willard Storage Battery Co. has produced an all-rubber storage battery. T. A. Willard, inventor and founder of the company, designed the new battery.

Everything in this new battery, except the plates, or grids, is of rubber. The wooden outer box has been supplanted by a case of hard rubber with seamless partitions, eliminating the need of individual jars.

The molded rubber case, besides eliminating the separate battery jar, resists decay and, it is claimed, much more effectively than the old wooden container since it is unaffected by the acid solution or by water. Being a non-conductor it also has less electrical leakage than a wooden case, particularly in damp weather.

The hard rubber case has a tensile strength of 3,600 lbs. to the sq. in. and successfully withstands the electrical test of 18,000 volts.



### From Storage Pile to Truck

1—This crane lifts the coal from the storage pile and places it on the loader, where it is distributed to the conveyor belt. 2—The conveyor belt carries coal from the loader and direct from the coal railroad cars to the hoppers. The belt has a capacity of 350 tons an hour. 3—Loading a truck with 7 tons in 5 minutes, from the bottom of a hopper. These hoppers hold 1200 tons of coal each



# Your Midwest Truck Engine

## 1—Disassembly and Inspection

By Otis E. Griner\*

**M**IDWEST heavy duty engines are made by the Midwest Engine Co., Indianapolis, Ind., in the following models and sizes:

Model 400—4½ x 6 in.  
Model 402—4½ x 5¼ in.  
Model 408—3½ x 5 in.  
Model 409—3¼ x 4½ in.

This article outlines the proper method of inspection, repair and adjustments of the Midwest engine.

In detailing the various steps necessary for a complete disassembly of all four models, it is necessary to point out some differences in construction between each of the four models.

All four engines are of the four cylinder, vertical, valve-in-head type, with three-point suspension and enclosed or open flywheel at the owner's option. The 4½ x 6 in. and the 4½ x 5¼ in. models have cylinders cast in pairs with cylinder blocks removable from the crankcase. The oil pump is located on the timing gearcase cover. The other two models have cylinders cast integral with the upper half of the crankcase. The oil pump is located on the flywheel end of the upper half of the crankcase.

The description of steps to be taken in the complete disassembly of the engines follows: Some steps have been eliminated, due to differences of construction.

### Removing Engine

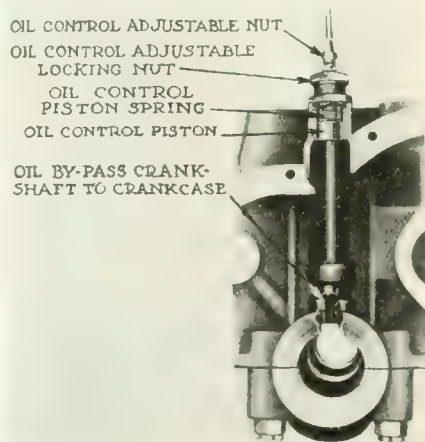
Drain lubricating oil and cooling water from engine. Disconnect gasoline line to carbureter, magneto terminals, oil pressure line to gage, radiator connections and clutch. It is not necessary, but advisable, to remove all accessories such as carbureter, governor, magneto, starter and generator, to avoid possible damage to them when removing engine from the truck frame. The engine can be readily removed by block and chain or rope falls. A forged steel hook of ⅝-in. thickness, and shaped especially for the purpose, can be inserted under the cylinder head and between the two cylinder blocks in the models 400 and 402 to lift engine from frame. If this device is not available, a rope sling of about 14 ft. in length can be used, placing one loop around flywheel end of crankcase just back of the bell

housing and the other loop around fan end, back of timing gear cover. Models 408 and 409 can be lifted by hooking tackle directly on stanchion bar after valve cover has been removed, but for general practice we recommend the use of the rope sling. It is advisable while the engine is still suspended by the block and tackle, to thoroughly cleanse the outside, with gasoline, of all accumulated dust and grease. It is also a good plan to cleanse with gasoline each part of the engine, as it is removed, and to lay them on a bench or floor space which has been previously cleared of all other units, to avoid confusion when reassembling.

### Engine Disassembly

The engine can be placed on a low bench or the floor, in an upright position by using cross blocking under the bell housing and front end of oil pan.

To remove the cylinder head permit-



Pressure regulator in the oiling system of the Midwest engine

ting inspection of valves, valve seats and cylinder bores, the following parts should be removed in the order given:

Valve cover.

Rocker arm stanchion bar, rocker arms and push rods.

Water outlet manifold.

The sixteen cylinder head stud nuts.

The eight cylinder holding-down bolts. (These are the long bolts passing through cylinder head, cylinder block, and seating in engine crankcase.)

The four push rod tube clamps and push rod tubes.

The exhaust and carbureter-intake manifolds, the magneto cable tube valves and valve springs, and the valve cover and stanchion bar studs need not be removed from cylinder head at this time.

The cylinder head can now be lifted off the cylinder head studs and blocked, bottom side up, while inspecting to see if regrinding of valve seats is necessary. (Care should be taken not to injure the cylinder head gasket when removing head.)

The cylinder head gaskets and cylinder head locating dowels should next be removed. There are four of these locating dowels used, two to locate the cylinder head on the cylinder blocks and two to locate the cylinder blocks on the crankcase. In the first Midwest engines built of the Models 400 and 402, a small steel ring was used in place of this locating dowel.

The cylinder bores can now be inspected. After removal of the water intake manifold the two cylinder blocks (Models 400 and 402) can be lifted off the engine crankcase, leaving the pistons and connecting rods attached to the crankshaft. These two larger sizes of engines have two cylinder blocks with bores cast in pairs. The blocks serve only as spacers between the cylinder head and engine crankcase. The cylinder head is drawn down tightly on the blocks by sixteen studs and the cylinder blocks and head are clamped to the crankcase by eight through bolts.

If it is also desired to remove all connecting rods and piston assemblies from the crankshaft, the next step is to remove the outside copper tubing oil lines. There are two of these lines, the suction lines, running from the oil pan pump to the oil pump on gearcase cover (Model 400 and 402) and the pressure line from the oil pump to the rear main crankshaft bearing.

After removal of these oil lines, the engine should be turned over to lie on side on which the magneto pad and pump are located.

The oil pan can be removed without disturbing the timing gearcase cover or bell housing with ready access to main and connecting rod bearings.

It will not, of course, be necessary to take off the oil pan or turn the engine

\*Service engineer, Midwest Engine Co., Indianapolis, Ind.



its side if but one or two of the connecting rods are to be removed, as by removal of the hand hold covers from the upper half of crankcase (on carburetor side of engine) the connecting rod cap bolts can easily be removed and the rods taken out.

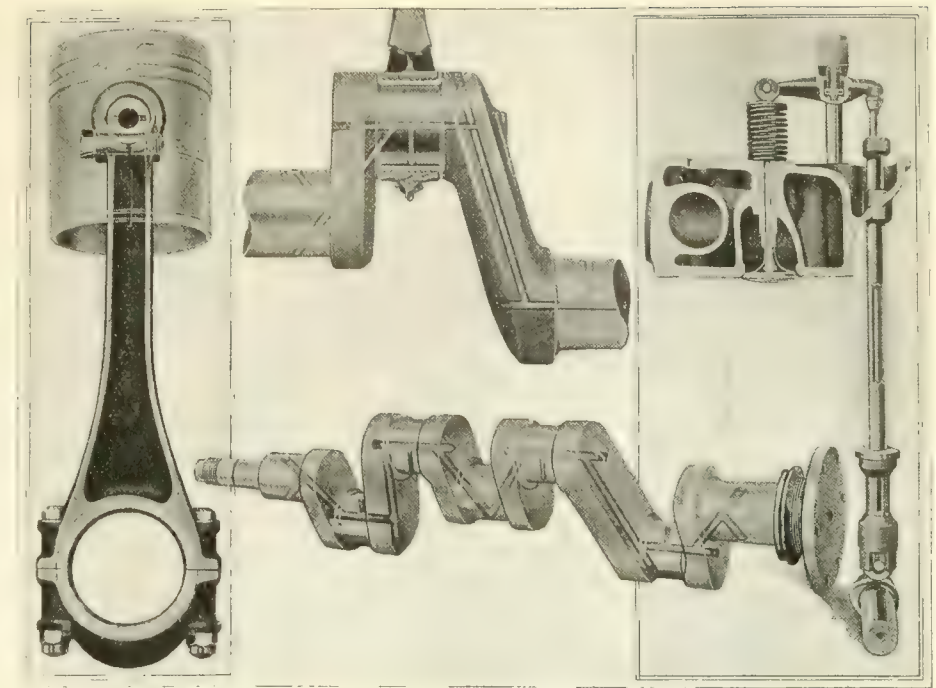
The next step in complete disassembly is the removal of the fan drive pulley, trunnion support block, and timing gearcase cover with the oil pump attached. The oil pump has an independent and flexible drive off the camshaft in all Midwest engines. It need not be removed from the gearcase cover (Models 400 and 402) before the gearcase cover is taken off engine, unless desired.

Next, remove the lower half of the bell housing, then the crankshaft with flywheel attached can be taken out after the main bearing caps have been removed. The engine—with exception of water pump and camshaft which remain in their original positions and the various sub-assemblies removed as units—is now completely disassembled and it is very easy to get at any desired part for a complete inspection.

### Engine Inspection

When the engine is being disassembled the following points should be checked over and in the order given:

(a)—Excess carbon on cylinder head, valves and valve seats shows that an unnecessary amount of lubricating oil is getting into the combustion chamber to foul spark plugs and valves, causing pre-ignition, irregular firing, burning of valves and valve seats. The deposit of carbon on valve seats (more particu-



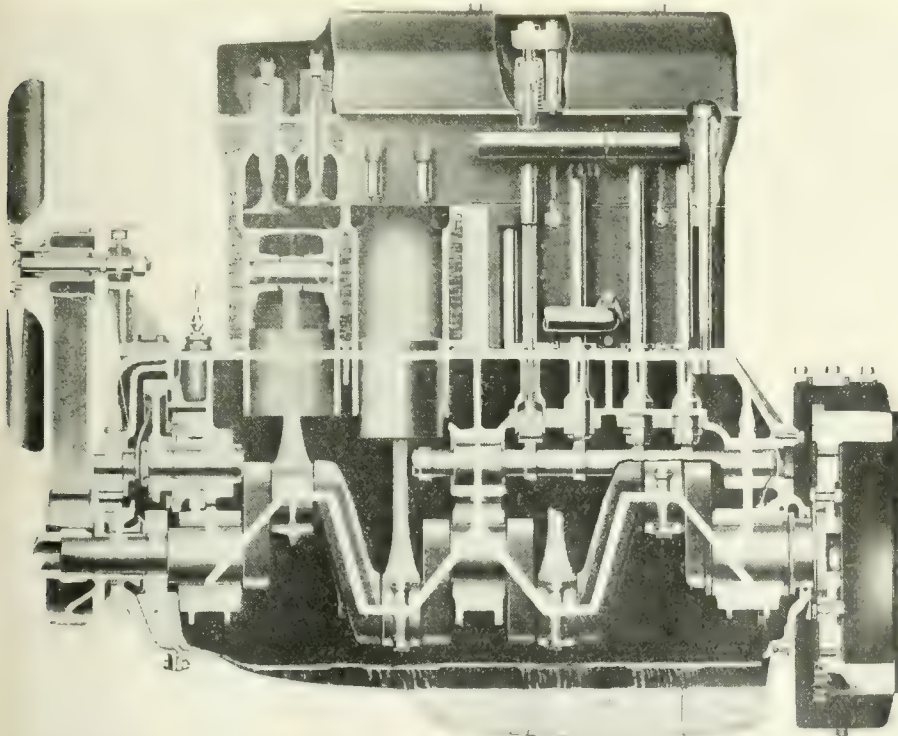
*Views of the Midwest connecting rod and piston assembly, the crankshaft bearing end, the special crankshaft design, and the full rocker type of valve mechanism*

larly the exhaust valves) will keep the valves from closing tightly, allowing the extremely hot exhaust gases to burn and warp them. This also leads to loss of compression and lowered horsepower. Hence the importance of inspection of valves and valve seats and regrinding where necessary to insure their seating.

(b)—The surface of the cylinder bores should be inspected to see if they are being properly lubricated and for signs of excessive wear. After an engine is properly run-in, the cylinder bores should present a smooth mirror-like surface all the way round. The clearance given pistons in the bore is approximately .001 in. per inch of piston diameter. The bores should be measured with micrometers or by placing feeler gages between the bottom of piston and cylinder walls to see if this clearance has been exceeded, due to natural wear, and whether the space is great enough to permit the charge passing the piston. For instance on a cylinder of  $4\frac{1}{8}$  in. diameter, a .004 in. feeler gage should fit loosely between piston and wall, while a .005 in. gage should fit tightly at the same point. In making this inspection the greatest wear will ordinarily be found at the top of the cylinder bore and piston, due to the greater bearing pressures and grinding action of carbon on piston rings at this point.

When fitting new pistons, regrinding the cylinder block is better than boring, reaming or lapping in of pistons. Regrinding insures the cylinder surfaces being straight and square with the base of the block and also gives a smooth, hard surface instead of the more porous surface obtained by boring and reaming. Oversize pistons can be furnished with dimensions .010 in. and .020 in. oversize, but it will usually be unnecessary to regrind blocks until the wear has been sufficient to require the .020 in. oversize pistons.

It is advisable to secure oversize pistons and rings to correspond with the new size to which bore is to be reground and measure these pistons with microm-



*Cross section of Midwest engine, bringing out points of interest in its general assembly*



eters. Their diameter, taking into consideration the clearance needed as described previously, will give the exact dimensions to which the bore should be ground.

The oversize piston rings should be fitted to the new cylinder bores just as carefully as are the pistons. The cylinder blocks should be placed on a bench, cylinder-skirt up and piston inserted in bore. Allow the piston to slip down and

rest on the bench also, then insert ring in bore, allowing it to rest against bottom of piston, which will prevent any possibility of it being in a cocked position when the ring gap is checked. The standard Midwest diagonally cut, ground ring has a gap of .003 in. to .005 in. or averages about .0009 in. per inch of cylinder bore.

The rings should be fitted to the piston grooves with a side clearance of .0015

in. This clearance or side play can be checked roughly by rolling the ring around the piston in the groove provided for it. If too tight, the ring can be narrowed by rubbing it on a piece of emery cloth laid on a flat surface. A final check of this proper clearance should be made with the ring in place on the piston and by the use of the .001 in. and .002 in. feeler gages.

(To be concluded)

## Shuler Brings Out Front Wheel Truck Brake

A DESIGN of front wheel brake has been evolved by the Shuler Axle Mfg. Co., Louisville, Ky., and embodied in a front axle for trucks manufactured by that concern. Heretofore front wheel brakes have been spoken of mainly in connection with passenger cars, but it is obvious that they possess considerable advantages when applied to trucks, especially in the case where the truck is used to haul trailers behind it. Powerful brakes are really essential on trucks, because so many of them are operated in the congested sections of the large cities where the chances of collision are great.

The Shuler brake is of the internal expanding, toggle-operated type. Adjustment required to compensate for wear of the brake lining is made by changing the length of the toggles. The links are hinged to lugs riveted to the brake band near its ends, and they also connect to a two-armed spider, the hub of which is adapted to slide up and down on an extension of the knuckle pin. The knuckle pin is keyed to the knuckle with a tapered key and turns with it, the upper and lower members of the axle yoke being suitably bushed. The bushing in the upper member is provided with a head forming a face cam or end cam, and the brake lever arm, the hub of which is inserted between this bushing and the two-armed spider, is formed with a similar end cam engaging with the former. Any pull on the brake lever causes it to turn

around the pivot axis and at the same time to rise on the knuckle pin, carrying with it the two-armed spider and spreading the ends of the brake band through the intermediary of the toggle links. When the front wheel is swung around in steering, the brake lever with its end cam, and the bushing in the steering yoke remain stationary, and the brakes, therefore, are not affected by the steering action.

The axle to which these front wheel brakes are fitted is of 2 and 2½ tons capacity. It has a drop forged I section center of .30 to .40 per cent carbon steel, heat-treated. Chrome nickle steel is the

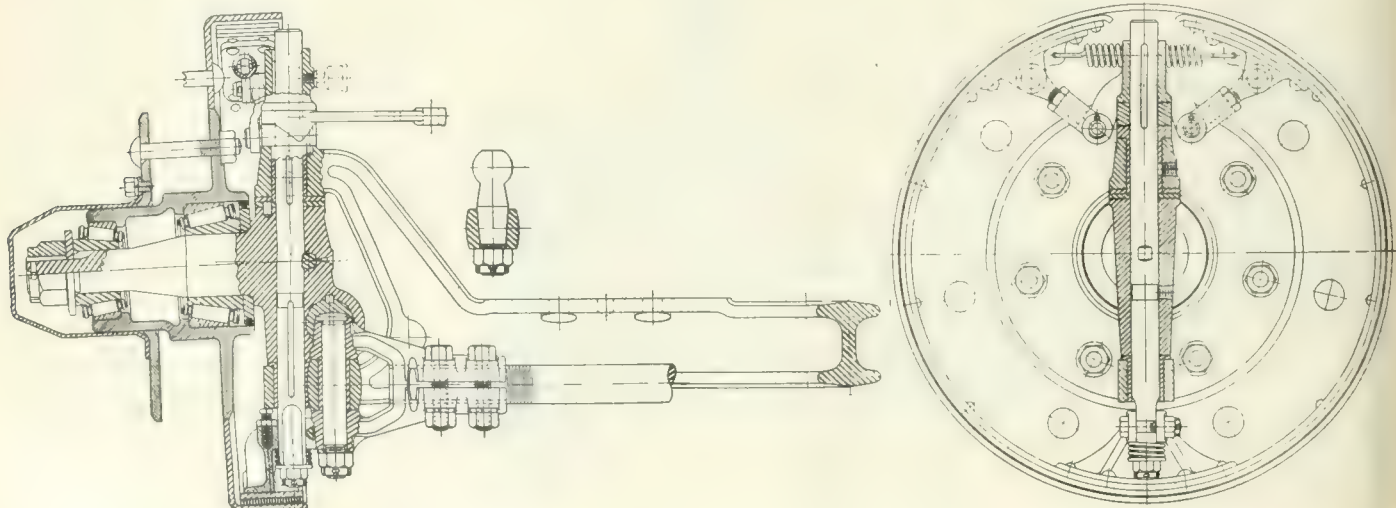
material from which the steering knuckle is forged, and the steering arms are of the same material. The hubs are of malleable iron and the caps and flanges of pressed steel. The materials used for the brake parts are as follows:—Knuckle pin, 3½ per cent nickel steel; drum, pressed steel; band, strip steel rolled to a true circle and lined with asbestos fabric; cam bushing, cold drawn steel, carbonized, hardened and ground; brake lever, No. 1035 S. A. E. steel, drop forged and heat-treated; toggle eyes and links, drop forgings; band fittings, malleable iron. The cam surfaces are true helical surfaces.

## State Permits 30 M. P. H. Truck Service

SAN FRANCISCO, CAL., Sept. 21.—A fast motor truck freight service, to average not less than 30 m. p. h., between Fresno and Los Angeles, is to be established immediately by F. M. Hodge and L. F. Mershon, who were granted a permit for the operation of the line by the California State Railroad Commission here recently.

The corporate limits of the city of Bakersfield are excluded from the operating lines, and from Bakersfield north the applicants were given a permit to serve the cities and towns of Jewetta, Lerdo, Famoso, McFarland, Delano, Richgrove, Orris, Ducor, Terra Bella,

Plano, Porterville, Strathmore, Lindsay, Exeter, Farmersville, Tulare, Visalia, Goshen, Traver, Kingsburg, Selma, Wine-dale, Fowler, Calwa and Fresno. The service guarantees a free pick-up at all ranches within a distance of five miles parallel with the main route followed by the truck line. The service is limited to fruit and especially designed for the handling direct to market of perishable fruits. The rate is considerably higher than rail rates, and, for this reason, there will be no real competition with rail carriers, according to the statement of the railroad commission in granting the application.



Cross section and side views of new Shuler front wheel truck brake



# Systems Are Like Clothes

By

Sinclair Gluck



ROSS, the fleet superintendent, hesitated in the doorway for a moment. "Busy, sir?" he asked.

The president of the big commercial house swung round in his chair to face the speaker and smiled. "Not too busy, Ross," he answered, pleasantly, "What's on your mind?"

"I—why, nothing special. I thought—" "Well, sit down, anyhow," laughed the old president, and Ross took a seat by his desk.

As a matter of fact the superintendent had been feeling restless and a little worried. Old Hammerhead, as the men called their president affectionately, was always ready to listen, so Ross had made his way up there in a lull of work with no particular object in view. But old Silas Gunther did not seem surprised.

"You look worried, Ross," the old man said. "Any of your boys off color, this morning?"

"No, not exactly." Ross hesitated. "The fact is, sir, that I've put a lot of good systems in down there in the shop—systems that ought to go like clock-work—and somehow, they don't. You know what they are, yourself. I'm sure there's nothing wrong with the systems."

"Must be something wrong with the men then, eh, Ross?" answered the old man.

Ross looked up quickly, detecting the gentle irony in the old man's words. "Well," he laughed, "I can't see anything wrong with the systems, but the men don't seem entirely satisfactory in the way they handle them."

Old Hammerhead leaned back in his chair. "Tell me about them," he nodded.

Ross scratched his head. "Well, here's the question of gasoline. I wanted a reliable check on the gasoline used. So of course I keep an accurate record of the amount we put into the big tank each time it is filled. Well, we've bought more than we've used. I mean the records of the gasoline drawn by the men don't tally with the amounts we buy. About 15 gallons have disappeared into thin air in the last month."

"Humph," said the old man, "that's bad. What check have you on the amounts the men draw?"

"They're supposed to enter all gasoline

and oil drawn on their daily cards at the time they draw it. I put them on their honor to do this—and they do seem to want to be entirely honest about it. Of course old Hinckle, who issues the gas, calls off the amount."

Old Hammerhead nodded. "Anything else?" he inquired.

Ross frowned. "Then there's another thing. You know, sir, that we have the usual list of parts on the back of the drivers' cards, so that the drivers can check off any part in which trouble has developed during the day?"

Old Hammerhead nodded.

"Well, I've explained to the drivers again and again the necessity of using those blanks. I've explained how just a little check at one item where there is trouble will often save a lot of money in repairs, by catching the small trouble before it can grow into a big one—"

"And—?" the old man encouraged him.

"—They don't do it, sir." Ross said, indignation in his voice. "They simply neglect it and no amount of talk has any influence. So we've had breakdowns."

Old Hammerhead threw back his head and laughed. "Did you ask them about it?" he inquired, at last.

"Yes, sir. I asked them first if they had noticed anything wrong. Some of them guessed they had. Then, I asked them why they had not reported the trouble and they didn't seem to know. I hate to fetch up against a stone wall like that."

The laugh faded out of the old man's eyes. He leaned forward in his chair. "We all hate it, Ross. But I think I can help you to find a way through that particular stone wall."

He hesitated for a moment. "Look here, Ross," he went on, finally. "Did you ever stop to analyze the general requirements of any system?"

"Don't believe I did, except for each particular case."

"Well, I'll tell you what I think those requirements are. I think any kind of a system for human beings should be, first of all, as nearly as possible fool-proof. Secondly, it should fit. I mean, it should fit the men for whom it is designed,—just like a suit of clothes."

Ross nodded, but looked somewhat puzzled.

"You see, Ross, in the last analysis systems are made for men, not men for systems—they are only laws, really. Now I think both the systems you have mentioned to me fall down a little. The first is not quite foolproof and the second does not quite fit."

"A system which is to be applied to a lot of untrained men must not be a delicate, fragile affair. If you have a piece of machinery that is delicate, you give it to an expert. And if a system is delicate, it must be handled by an expert."

"Now, your system for checking the gasoline is a somewhat delicate one, because it depends upon the memory of untrained men, who are doing something else at the time. Therefore, Ross, why not put it in the hands of an expert? In other words, why not let the man who issues the gasoline, who has that only in mind at the time—why not let him enter the amount on the drivers' cards?"

"Say, why didn't I—"

Old Hammerhead held up his hand, smiling. "And as for the reports on incipient troubles, etc., Ross, the idea is good. That part of the system is all right. But you've talked about it too much. That part of the system is wrong."

"The psychology of drivers is a study by itself, Ross. They reason, but not the way you and I do. The more you talk at them—urge them to do things—the less inclined they are to do them. But if you make it easy to do them—help them—that's a different thing. You see, your method didn't fit them."

"Now, if you take a minute to run over the card with them each night when they come in and help them check up troubles, I think you'll find there's a difference. But at present I guess they don't report faults because they're afraid the mechanics will find nothing wrong and then they'll be laughed at. While if you help them, the responsibility is yours. Do you see the difference?"

Ross jumped to his feet. "I sure do, sir. Thanks. I—I knew I'd get what I wanted from you, sir, even if I didn't know quite what I wanted myself!"

Old Hammerhead smiled slightly. "All right, Ross," he said. "Try to use my methods and find it yourself, next time."



# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 572—Screwdriver With Two Different Sized Ends

**T**WO screwdrivers in one is possible by following out the idea in the accompanying illustration. Moreover it is possible to have two different sizes of drivers. This can all be accomplished by using both ends of a screwdriver instead of only one as usual. By having the socket in the handle large enough to hold the larger end of the driver, it is manifest that the smaller end may also be inserted. The value of this idea is apparent when it is figured as a time saver in the exchange of sizes.

Frequently there is a need for additional power to be brought to bear on a screw that is stuck or wedged in tightly. Due to the limited grip surface on the handle it is impossible to use both hands and even when that is possible it is found inadequate.

A good plan is to bore a hole in the center of the driver and then use this hole for the insertion of an iron rod. The latter can then be used for additional power in turning the screw.—ALBERT STAHLE, New York City.

## No. 573—Running-In Stand for Engines

**T**HOSE fleet superintendents who have been contemplating the construction of a running-in stand will be helped by the suggestion shown herewith. This is simple in design and can be easily constructed. A frame, such as is shown in the accompanying illustration, mounted on casters will serve the purpose. In addition to serving the purpose of running-in an engine, it will also take care of axles and gearsets.

The engine bed plate consists of cross pieces of steel I-beam, bolted to a single side frame member only. This permits placing the 3 hp. D.C. electric motor in the center on an end frame cross member.

Being in this position, it is possible to drive the axle direct and the engine by chain through a gear reduction. The controller box with the main rheostat is placed conveniently to the side of the electric motor. With 20 to 30 ft. of wire, it is possible to move this portable stand to most any place in the shop or garage proper. This obviates the need of energy and time consuming moving of the various units before installation on the stand.—C. R. SIMMONS, New York City.

**T**O help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

## No. 574—Eliminating Ford Lamp Trouble

**T**HE accompanying sketch may not be a new idea but it has stopped the continuous lamp trouble on the Ford series headlight system. As there is little need for bright lights on the trucks, the system has been changed to that of parallel, using 24-volt lamps.

As a result of this change, the inventor of this idea has had but one broken lamp in about 7 months.

The headlights were removed from in front of the vehicle and bent as shown in the sketch. They were then placed in front of the dash. One switch, it will be noted, operates all of the lights.—R. C. REUTHER, Jamaica, N. Y.

## No. 575—Wire and Rag to Clean Out Small Holes

**I**T is not often very easy to clean dirt out of small holes, such as valve holes. It is a simple matter to accomplish by following the idea shown in the accompanying sketch. Take a piece of rag, twisting a wire around it. The rag will then be stiff enough to carry out the cleaning operation.—CHARLES BOEHME, Gobel's Garage, Brooklyn, N. Y.

## No. 576—Headlamp Makes Efficient Working Light

**A** NIGHT lamp to facilitate the work of repairing trucks after dark is readily made, using an old headlight containing a silvered reflector and a medium candlepower bulb in conjunction with the storage battery of the truck.

It is mounted on a wood back board and secured by means of a nut. Over the face of the headlight glass, a piece of guard wire is fitted to prevent breakage. On one edge of the wood back board a heavy screw eye is placed to hang the fixture over a nail as required. For under truck work the fixture is simply placed flat.

The concentrated beam of light is superior to the usual open light and even the work of fitting bearings inside the engine can be carried out with the help of this light to illuminate the part clearly.—M. MEYERS, Brooklyn.

## No. 577—Holding Shims On Connecting Rods

**D**URING the removal of the connecting rod caps for some purpose other than the removal of shims for tightening of the bearing, it is better to keep the shims intact or undisturbed.

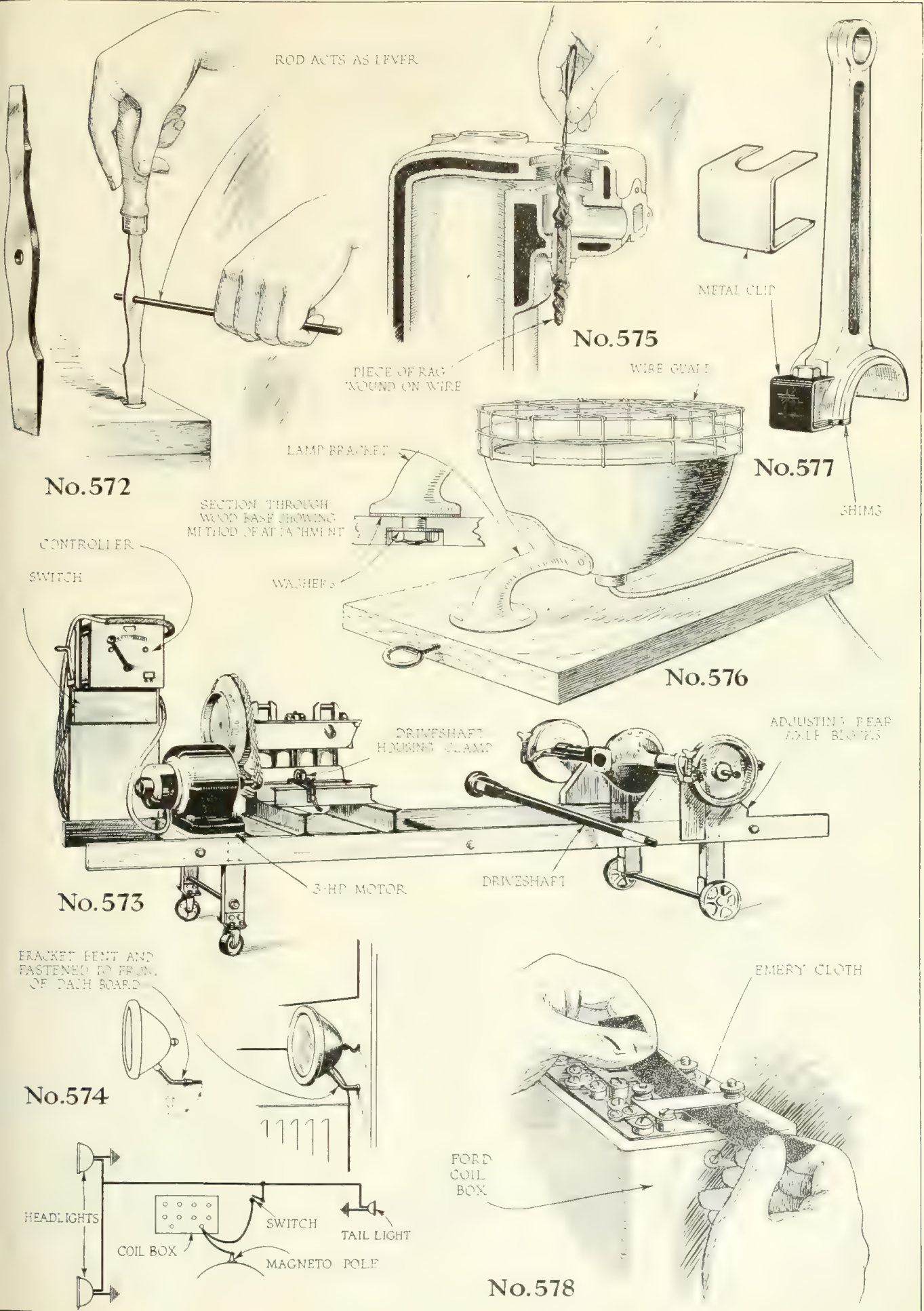
The shims may be held in place on the connecting rods while the cap is removed by means of a metal clip which is bent and cut, as shown in the accompanying illustration.—S. E. GIBBS, Corydon, Iowa.

## No. 578—Smoother Running With Clean Contacts

**E**MERY cloth comes in handy around a Ford when trouble occurs. It is indispensable around the coil. Frequently too close contact between the adjusting screw and the vibrator will cause the tungsten points to pit. This results in sticking and frequently burning away the tungsten and often putting the engine out of action and invariably causes misfiring.

This may be remedied by cleaning the points with fine emery cloth. It is advisable, however, to be very careful and file flat. Emery cloth also comes handy when the engine is missing. Trouble often occurs because of dirt contacts on the coils. Emery cloth applied with care will clear away the trouble.—N. S. BEEBE, Beebe Storage Moving Co., Kansas City, Mo.





### No. 579—Durable Hose for Radiator Connection

ONE difficulty with the usual stiff fabric and rubber radiator hose connection used at upper end or outlet from the engine to the radiator is the invariable loosening of the hose at the clamp through vibration and the resultant loss of the water. In one of the mountainous regions of Virginia, practically every motor vehicle is fitted with a hose connection which eliminates this trouble.

The connection consists of a piece of inner tube, twice the length of the required hose, doubled back upon itself and secured by the usual clamps. This flexible double thickness connection will stay in place regardless of how rough the roadway may be and is a sure cure for water leakage.—G. SESSIONS, Norfolk, Va.

### No. 580—Tire Repair Outfit for Small Garage

IN the small truck shop, facilities for the repair of tube punctures or for plugging small cuts in the tire casing by vulcanizing, are necessities. Practically all shop mechanics understand the method of using a small gasoline vulcanizer for these purposes. However, the details of equipment which can be added to the bench, used for repairing these cuts and shown in the attached sketch, simplify and expedite the work.

Two teaspoonsful of gasoline are the exact measure necessary for the vulcanizer. This is not a guess and a simpler measure could not be desired. Place a teaspoon and a can of gasoline with covering lid, such as a 1-lb. grease can, at the rear edge of the bench where it is handy. Above the bench at the rear wall several trays made from varnish cans by cutting out one side and nailing against the wall, afford a place for the several materials and tools used, and assure that these can be found when wanted.

As a rest for the tube or wire, a piece of plank about 6 in. wide nailed to extend about a foot over the edge of the bench is needed. Making two holes in this for attaching hooks when placing the vulcanizer on a casing cut is far simpler than chaining the vulcanizer about the tire, and fixes the tire in such a position that it will not overturn and spill the flaming gasoline.

While locating a small hole in the tube it is not necessary to keep the hands submerged in water all the time. Take two wire hoops and twist them into forks as shown, and use them to hold the tube under water. Not any of these suggested contrivances will cost money, but they will make the work simpler.—R. WOOD, Newark, N. J.

### No. 581—Getting More Pressure With Drill

HANDLING a drill while working under the chassis does not give the same opportunity for getting pressure as when standing up with the drill.

Either the mechanic is forced to lie flat on the floor and procure pressure by bearing upward, or resort to some other method less tiresome and cumbersome.

The illustration shown herewith is an excellent way for eliminating this tiresome work under the chassis. Take a strip of heavy wood and cut a small groove in it. This groove is used for the handle of the drill when the idea is put into operation. A block of wood under the strip of wood acts as a fulcrum, thus giving leverage to it. Pressure from the handle of the strip of wood tends to keep the drill at the desired pressure and also steadies it.—CHARLES BOEHME, Gobel's Garage, Brooklyn, N. Y.

### No. 582—Simply Made Press for Repairshop

HERE is a press that is simple in design and easily made. It is made from a screw jack and an old car frame in a simple and inexpensive manner. The frame was cut off and two cross members were riveted on as a stand. The jack was then secured by bolts in an inverted position, as shown in the accompanying illustration.

The distance between the sides of the frame made the press suitable for handling wheels and similar large parts, in addition to the usual small work of pressing in bushings and wristpins.

The construction and materials are inexpensive enough to warrant duplication of this rigging in any shop or by the small owner who desires to do his own repair work.—H. B. GRANT, Plainfield, N. J.

### No. 583—Locking Gearset Gears

IN removing the universal nut or for other purposes it is sometimes convenient to lock the gearset gears together so that the main shaft will not move. To do this, place the gearset in high gear and reverse gear at the same time.—F. G. CASH, Gaffney, S. C.

### No. 584—Inserting Brake Lining Rivets

WHERE brake linings are secured to the shoe by means of clinch rivets it is sometimes difficult to drive the rivets in straight in the lining due to the fact that there is a web reinforcement which makes it difficult to get at. A tool made of 5/16-in. steel, shaped on one end like the rivet, eliminates the difficulty of driving the rivets straight.—H. R. MILLER, Eustis, Fla.

### No. 585—Economical Oiling in Drill Work

IT is not hard to realize that in drilling work there is considerable waste so far as the use of cutting compounds is concerned. The usual practice of a mechanic is to keep the compound in a squirt can and then use it in such a way that there is little chance for economy.

Furthermore, the job, when it is finished, is usually well covered with oil or other compound.

Instead of using a squirt can, the idea set forth in the accompanying illustration will be found much more economical as well as much cleaner. Simply use a small cup of oil and raise the drill just before dipping the point of the drill in the cup. This is much cleaner and more economical.

The following are the cutting compounds for the various metals: Hard steel—turpentine, kerosene; soft steel—lard oil, machine oil; brass—soda water, if anything; aluminum—kerosene; cast iron—none.—N. S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

### No. 586—Screwdriver for Close Places

A SCREWDRIVER for inserting screws in places difficult to get at is made from a flat piece of steel which is flattened at the lower end and tapered to form the screwdriver blade. The ends spring out and hold the screw while it is being put in place.—A. MEANY, New York City.

### Control of a Big Fleet

(Continued from page 9)

"When the truck leaves the yard for the garage in the evening, the driver is given a daily service slip which shows the truck number, date, the time the truck arrived at the yard, number of trips made, tons hauled, and time the truck left the yard for the garage. If the truck left loaded, this is noted on the slip, with the address where the load is to be delivered. All this information is taken from the shipper's sheet which he keeps during the day. When the truck arrives at the garage it is timed in on the routing sheet, which is the same sheet on which it was timed out in the morning.

"We keep a very accurate record of every tire. We have spare wheels equipped with tires, so that to replace tires it is only necessary to change wheels. The wheels taken off are sent away to be fitted with new tires. Then they are ready for the next truck. We always have a good stock of each sized tire, so that we do not have to depend on tire agencies. This stock often reaches \$12,000 in value.

"Our tire record card includes the following: truck number, wheel on which the tire is mounted, size of tire, make type, tread, tire number, date mounted hubodometer reading, date taken off hubodometer reading, total miles of service, and disposition—whether it was returned for adjustment or scrapped. Each requisition from the stockroom for a tire change has the hubodometer reading and is placed on the superintendent's desk. The latter keeps the tire record personally for it is very easy for a tire change to go through without being posted on the tire record."



No. 579

No. 580

No. 581

No. 582

No. 583

No. 584

No. 585

No. 586

No. 587

## Buyer's Department of The Commercial Vehicle

# Spring Suspension a Feature of New Mack Bus

### Rubber Shock Insulating Blocks Replace Usual Spring Shackles

A NEW type of spring suspension intended for use on buses with cushion or high crown tires has been designed by the International Motor Co. The results of tests during the past year with this new bus have been so satisfactory that the company has decided to place it on the market. Though mounted on solid tires, this shock insulated bus combines riding qualities equivalent in comfort to those of pneumatic tired units and is said to give a cost of operation less than that previously secured by units on solid tires.

While the chassis is identical in most respects to the standard 2½-ton Mack AB dual reduction chassis, several new features are incorporated. Of these the newest and most unusual is the use of rubber shock insulating blocks in place of the usual metal spring shackles.

The ends of the springs are embedded in blocks of rubber which are carried under compression in housings attached to the spring brackets. These blocks replace the usual metal spring shackles and spring attachments and eliminate metallic contact between the spring and frame members. The rubber blocks are made of especially cured compound similar in some respects to that used in certain grades of solid tires.

The boxes used in place of the usual spring brackets are made in two sections. The upper half is riveted to the frame in much the same manner as the ordinary spring bracket, while the lower half is bolted to the upper portion. When bolted in place the rubber is placed under a compression of about 80 lbs. per sq. in. The ends of the springs are embedded in the rubber blocks in such a way that the springs can deflect as well as take thrust in the usual manner. In the case of the rear springs the ends of the two upper leaves are carried between two metal liners riveted to the ends of the leaves and in contact on their

outer surface with the rubber blocks. The liners increase the area of contact with the rubber, thus decreasing any tendency for wear between the two surfaces. As the movement of the front springs is very much less than that of the rear springs, the metal liners are omitted in the forward springs. Hotchkiss drive is employed in the same manner as when spring shackles are used.

Among the advantages claimed for the use of rubber shock insulators are the following:

1—No lubrication required. 2—Upkeep much less, since no grease cups and no grease or oil is required, and no cleaning

of the tires. 10—Does away with shackles, spring eyes, bushings, hardened and ground steel shackle pins, grease cups, shackle bolts and nuts. 11—Two or more main leaves of the spring can be made to bear in the rubber, thus giving added strength. 12—Spring construction is simplified and cheapened, since no wrapped eye is required.

Test runs of 20,000 miles and over indicate that the rubber insulators will stand up for 25,000 miles or more without renewal. The eight shock insulators can be renewed by two men in approximately 1 hr., and the cost of a set of new insulators is nominal, being in the vicinity of \$30.

These insulators are supplied only on passenger-carrying vehicles and usually with cushion or high profile tires. The bus chassis is equipped with Kelly-Springfield caterpillar No. 23 compound 34 x 5-in. tires front and rear, the rear tires being dual.

The following figures on the relative cost of operation with solids and pneumatics are given by the International company: "On buses operating 50,000 miles, five or more sets of pneumatic tires are required per year, costing not less than \$3,200. For a bus equipped with rubber shock insulators three sets of solid tires should cover a year's operation at a cost of approximately \$970—thus producing a net saving of \$2,230 per year, or nearly 4½ cents per mile."

One other feature which materially affects the riding quality of the Mack bus is the use of unusually long rear springs. These measure 60 in. from center to center of the spring brackets.

An effort has been made to lower the bus body in the design of the Mack bus chassis. This has been accomplished by the use of a 34-in. instead of a 36-in. wheel, by elimination of the spring shackles and by mounting the floor of the bus body directly on the chassis frame. The difference in height to the top of the

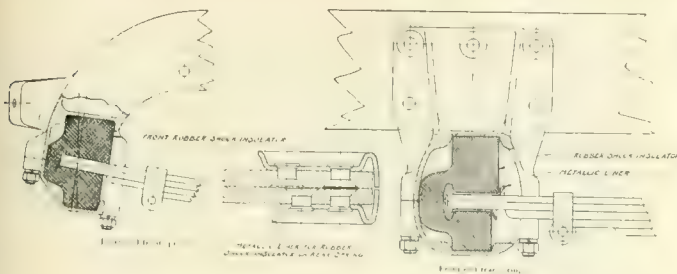


*New Mack bus mounted on solid tires compared in height with old type mounted on pneumatics*

is necessary. 3—Ability to insulate the frame from many shocks ordinarily transmitted from the springs, and thus improve riding qualities of the vehicle. 4—No friction between surfaces, consequently no wear, looseness or rattle. 5—The rubber tends to compensate for twisting action between spring and frame. 6—Side and end thrust taken without metal-to-metal contact. 7—Less horizontal motion of axle, because springs elongate from middle toward both ends. This makes for better steering and tends to prevent unnecessary brake action. 8—Tends to reduce so-called "crystallization" of the frame, steering gear parts and other members due to vibration transmitted by shackles of the older type. For the same reason the tendency of nuts and rivets to loosen is decreased. 9—Increase in the life



# Buyer's Department of The Commercial Vehicle



Sectional views of the front and rear brackets



Close-up view of Mack rear spring bracket

chassis frame effected by the use of solids instead of pneumatics is from 7 to 8 in.

Other particulars in which the bus chassis differs from the standard Mack AB truck chassis are as follows:

The muffler pipe is extended to the rear of the chassis in order that the exhaust gases may not enter the body in the vicinity of the entrance door. The gasoline tank is located outside of the body in the rear of the chassis, fuel being fed to the carburetor by means of a vacuum system.

The engine is substantially the same as that used in the truck chassis, except for slightly different clearances used on the pistons and valves made necessary by the fact that the engine runs at a higher governed speed than in the case of truck applications. The engine is governed to 1425 r.p.m. as against 1275 for the standard truck engine.

The four-speed gearset, dual-reduction rear axle, the front axle, steering gear and other mechanical units are substantially the same as those used in the truck chassis.

The standard bus twenty-five passenger body is substantially built, all body frame members being of first quality thoroughly cured oak with mortise and tenon joints set in white lead and dow-

eled with oak pins. The floor of the body is of 1¼-in. tongue and grooved maple, with maple wear strips attached. The seats are carried on light pressed steel pedestals. Seat cushions are given a tilt aft, are covered with imitation leather and provided with comfortable springs.

A two-leaf folding door is provided at the front of the right side of the body. It is arranged for operation by the driver from his seat. Three steps are provided at the entrance. The first step is 15 in. from the ground, while the other two are each 10 in. high. An emergency exit which can be opened from the inside in case the entrance door is blocked by accident or otherwise is provided. The windows are equipped with anti-rattlers and have movable lower sashes which drop into the casing beside the seats. Eight electric dome lights are distributed over the ceiling, and a step light located inside the body is so arranged as to be lighted automatically when the door opens. A heating system using exhaust from the engine is provided. This consists of two lines of guarded pipe running the full length of the body on each side near the floor. A valve controlling the by-pass of exhaust through the heating system is located under the floor near the entrance door. Two front and two rear ventilators with shutters are pro-

vided. Advertising racks for standard size advertisements extend along the inside of the body on both sides above the windows.

The bus is, of course, arranged for one-man operation. The driver is protected by a rail, and a sliding curtain placed back of the driver's seat prevents reflection of light on the windshield when driving at night. A mirror placed over the operator's seat is arranged to give him a view of the interior of the bus and, through the rear window, of the road behind.

The length of the body inside at the seat line is 18 ft. and the width at the same point is 6 ft. 7 in.

The following additional body equipment is furnished at extra cost: Newbold lighting system consisting of a special generator with automatic regulator arranged to charge the battery and feed the lighting system at a constant rate irrespective of speed of engine; electrically lighted roller destination signs; electric buzzer system with buttons located on window posts; spring roller window curtains; spring edged cushions; ceiling of Agasote or similar material attached to roof bows and fare register.

The price of the bus chassis with 25 passenger body and standard equipment is \$6,730.

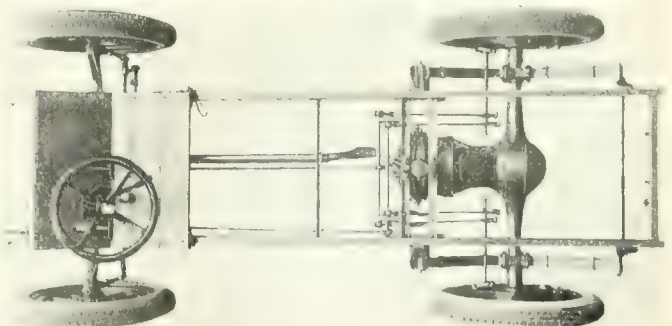
## Lansden Electric Enters Speed Truck Field

THE motor truck field this year has been featured by the appearance of a large number of gasoline-propelled speed trucks which have met a demand for light and quick city deliveries. Now comes the announcement of a new electric speed truck of 1500-lb. capacity. This new model is being placed on the market by the Lansden Co., Inc. The chassis price is \$1,600.

Though the new Lansden's speed is limited to 15 m.p.h. when loaded and to 16½ m.p.h. when empty, this is quite an improvement over the speeds obtained previously with electrics mounted with solid tires. The Lansden speed truck is equipped with pneumatics and the m.p.h. obtained is about up to the limit of the speeds permitted in cities.

The chassis without battery weighs 1700 lb., the body allowance is 700 lb. and the battery weight is 1385 lb. in case of a lead battery and 1085 lb. in

case of an Edison battery, making the total weight of the truck in running condition 3685 lb. with a lead battery and 3385 lb. with an Edison battery.



Chassis of Lansden 1500 lb. electric speed truck



# Buyer's Department of The Commercial Vehicle

## Airco Ignition Gage

THIS is a compact vest pocket instrument about the size of a man's finger. It enables a truck driver or mechanic to detect instantly faulty spark plugs and to locate short-circuits and leaks of current in the wiring between the plugs and the coil, or magneto.

The designers of this instrument have ingeniously utilized two characteristics of Neon, one of the air's rarest gases. It has been found that Neon offers so little resistance to the passage of electricity, that, where a 15,000-volt current is required in air, a 200-volt current will suffice in pure Neon. It has also been found that Neon becomes luminous when electrified, emitting an orange-red light as current is passed through it.

The gage consists of an insulating hard rubber shell into which is packed a sensitized tube of Neon. When the metal cap, which permanently seals one end of the gage, is brought into contact with a high-tension electric current, the Neon becomes luminous and emits flashes of orange-red light, visible through the indicator in the side of the case. If there is no flash, a fouled plug or lack of current is indicated. If the flash remains dim when the spark plug is known to be in good working order, it indicates lack of compression in the cylinder.

The manufacturer is the Air Reduction Co., New York City, the sales being handled by the Edward A. Cassidy Co., New York City. The price is \$1.

## Rentz Spark Plug

A NEW spark plug recently placed on the market by the Rentz Spark Plug Co., Atlanta, Ga., is featured by an adjustable intensifier gap built into the plug body, and by an insulated short-circuiting switch which can be used to test the plug whenever necessary.

The claim made for the intensifier is that if the plug should be fouled the intensifying gap will cause it to again resume its function and burn itself clean.

## Easton Scoop Body for Fords

THIS scoop body is of the self-dumping type and is made of steel throughout. It is furnished as a complete unit and can be attached or detached by means of four simple U-bolts. It is made of ½ in. steel plate with smooth rolled and welded steel reinforcing flanges around the top. The bottom is reinforced by angles. The sub-frame is made of channels securely framed together. Made by Easton Car & Construction Co., 50 Church St., New York.

## Protexometer

A N electrical temperature indicating instrument. It consists of two units, an electrical indicating instrument lo-

## Truck Equipment

cated on the dash or in the convenient view of the operator and a thermostatic electrical unit attached to the cylinder block of the engine. The thermostat is so arranged that when affected by heat it will cause a varying voltage drop in the electrical circuit through the dash instrument, and is so adjusted that one degree of heat causes a variation of 1 ohm in the resistance of the circuit. A contact switch is located in the thermostat, and when a certain high temperature is reached this switch is automatically closed, interrupting the ignition circuit, thus stopping the engine. The maker is the Protexometer Mfg. Co., Inc., Camden, N. J.

## Double Seal Oil Control Piston

THE action of this piston is such that the oil from the crankcase is said not to get up into the combustion chamber. It is claimed that this is due to a special oil control feature which equalizes the pressure of air, which is always present in the crankcase, by a corresponding amount of air pressure above the oil groove. This action causes the excess oil, which usually gets by the skirt of the piston to flow back into the crankcase from the oil groove. Pistons may be ordered from stock for Fords and other small cars. The maker is the Double Seal Ring Co., 2335 Michigan Avenue, Chicago.

## Kurtz Gas Engine Governor

THE feature of this governor is that it is controlled by the volume of fuel mixture. It consists essentially of a very light spring controlled butterfly valve which adjusts itself to the velocity of the gas passing into the intake manifold. The maker is S. E. Kurtz & Son, Sac City, Iowa.

## Atwater Kent Type N Coil

A DAPTABILITY is the feature of the new Atwater Kent Type N Universal Ignition Coil, which has been designed so that it can be used on any engine using battery ignition. It is made for operation on both 6- and 12-volt circuits. It is furnished with either flange or bracket mounting, and the coil may be mounted in any desired position. The condenser used with this coil is an individual unit, which may be purchased separately. This permits the use of this coil on systems in which the condenser is contained in the coil or on which a separate condenser is mounted on the distributor. The maker is the Atwater Kent Mfg. Co., Philadelphia.

## Cut Speed Governor for Fords

THIS governor is of the centrifugal type and is driven by the worm. Consequently its operation is dependent on the road speed of the truck. A butterfly valve is inserted between the carbureter and the intake manifold. The governor operates this valve by means of a control wire which is carried in a casing from the rear of the truck. The price is \$30. The maker is the Wisconsin Mechanical Products Co., Fond Du Lac, Wis.

## Collapsible Tire Rim

THE removal of this rim is accomplished without the aid of irons, screwdrivers, etc. The tire is simply slipped over the rim and the rim is securely locked by a slight pressure of the unlocking joint which snaps it back into place. There are no hinges or working parts in this rim. In the event of tire trouble all that is required is the removal of the tire and rim by giving the rim a sharp bounce and unlocking it. The maker is the Collapsible Rim Corp., New York City.

## Traxion V-Type Fan Belt

A NEW principle of construction features the Traxion V-type belt recently put on the market by the Cincinnati factory of the Perkins-Campbell Co. Owing to structural differences, this belt will actually transmit more power when it is loose than when it is tight. It is stated that it will not slide or ride off the pulleys. As shown in the illustration, the leather is pulled over and pressed into a V-shaped unit, thus forming an opening or crease as it passes over the pulleys, centrifugal motion pressing the entire traction surface of the V-shaped section outward against the pulley walls and crowding it well down into the pulley groove.

## Reflexscope Truck Mirror

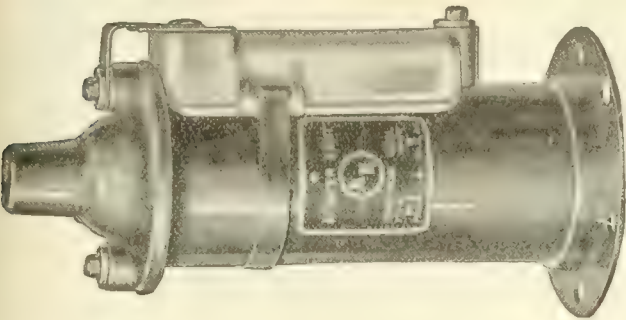
THIS has been designed to comply with the laws of practically all States which enforce a mirror law. These mirrors are made to withstand vibration. The maker is the Lawson Auto Specialty Co., Brooklyn, N. Y.

## Jon-Con Tire Protector

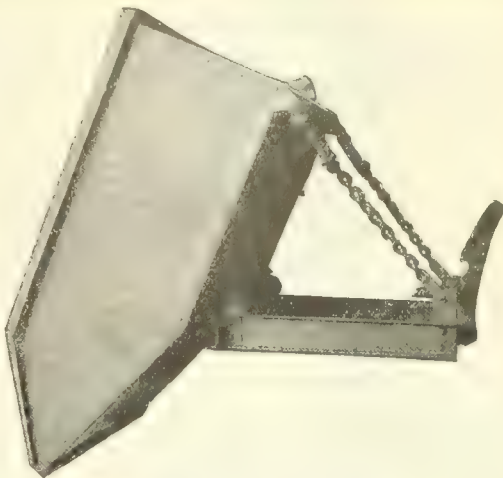
THIS has been designed for use in new or old casings. It is made of one continuous molded piece of firm elastic rubber, reinforced and placed on the inside of the casing between it and the inner tube. Being longer in circumference than the casing, this protector is compressed into place, not stretched as the tube and casing are. This is the puncture feature. The maker is the Jon-Con Tire Protector Co., Philadelphia.



Buyer's Department of The Commercial Vehicle



Atwater Kent ignition coil



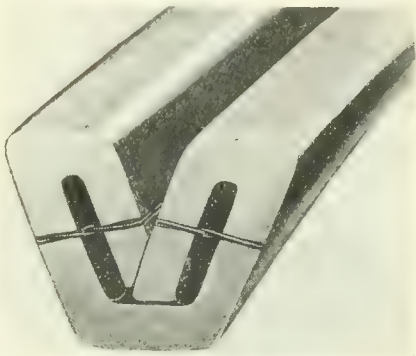
Easton scoop body



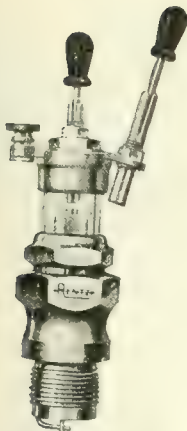
Protexometer



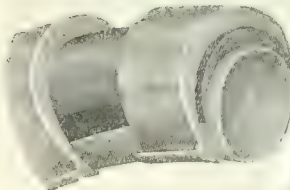
Double seal piston



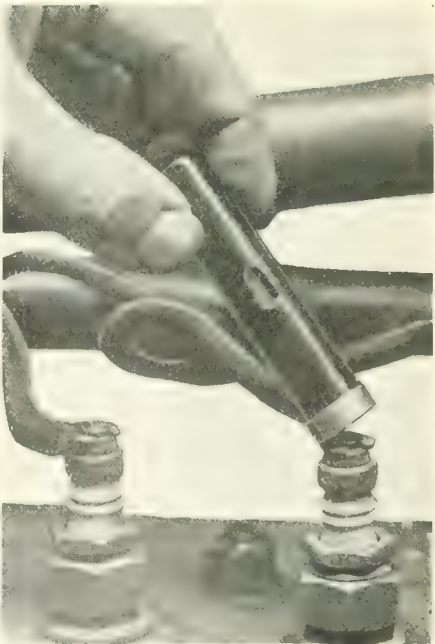
Traxion V-type fan belt



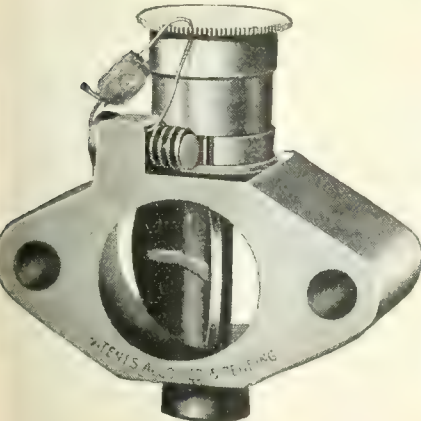
Rantz spark plug



Above—Collapsible tire rim  
Below—Jon-Con tire protector



Arco ignition gage



Kurtz governor



Cut speed governor for Fords

# Buyer's Department of The Commercial Vehicle

## Landis Crankshaft Grinder

BY an ingenious method of counterbalancing the head and tail stock, the Landis Tool Co., Waynesboro, Pa., has succeeded in developing a new grinder in which crankshafts may be refinished at high turning speed. After a crankshaft or other shaft having off-center parts is installed and centered in the machine the counterweights are added until the part can be revolved at high speed without vibration.

The crank carrying fixtures have been designed to handle crankshafts easily, and all loose attachments such as chucks, dogs, blocks and so-called throw blocks have been eliminated.

The work carrying heads are a part of the headstock and the tailstock is equipped with three-jaw universal chucks, the arrangement of which is such that they can be shifted off center to a sufficient extent to accommodate any size of crankshaft.

It is claimed that the 24-in. grinding wheel, when driven by a 5 hp. motor, will regrind a four-throw shaft in from 1 to 1½ hr., and a six-throw shaft in from 1½ to 2 hr.

## Universal Grease Cup Wrench

THE corrugated jaws of the Universal grease cup wrench grip the knurled or indented tops of grease cups firmly, while the long extension handle permits of reaching into inaccessible places easily. The tool may also be used for opening and closing petcocks. The retail price is 65 cents. The maker is the Stepanian Mfg. Co., Columbus, Ohio.

## Cylinder Reboring Tool

THIS tool may be operated either by hand, drill press or with a special power attachment for use with an electric or air drill. It is adapted for use on all types of engines. The tool is portable and weighs 40 lb. All wearing parts are adjustable. It is made in several sizes and the cutter head has a universal adjustment. The maker is the Universal Tool Co., Garwood, N. J.

## Goodell-Pratt Inside Micrometer

THIS inside micrometer, which is known as No. 618, will take care of all measurements by 1/1000 in. from 2 to 6 in. The lead screw has a ½-in. run. Four measuring rods are furnished and also a hardened steel collar ½ in. in length, which can be slipped over any rod between the shoulder and the chuck. A lower row of figures is graduated on the barrel, from which the measurement can be read directly, when this collar is in use, without the neces-

## Shop Equipment

sity of making allowances for the length of the collar. Each micrometer is furnished with a long handle for use in places that cannot be reached with the hand. The price is \$12. Price of leather case, \$1.80. The maker is the Goodell-Pratt Co., Greenfield, Mass.

## Thomason Piston Aligner

A SPECIAL tool for securing correct alignment of the piston and connecting rod assembly. Bushings are furnished which fit over the mandrel so that various sizes of connecting rods may be aligned. Price \$55. Bushings \$3 and up. Made by Shepard-Thomason Co., Los Angeles, Cal.

## Myers Combination Work Bench

THE equipment on this bench consists of the following tools: Geared automatic hack saw, 6 in. by 6 in. complete with vise, 10 in. sensitive drill with table and ¾ in. chuck, grinder head equipped with one emery wheel and one muslin polishing wheel, 4 in. machinist vise with hardened steel jaws, countershaft and ½ hp. electric motor. The table is 39 in. wide, 78 in. long and 33 in. high. It has two drawers for small tools. Made by Myers Machine Tool Corp., Columbia, Pa.

## Esco Double Face Flaring Tool

THIS is a double face, self-opening tool which is said to give the proper flare and taper to either copper or brass tubing in four sizes with one blow of the hammer. The sizes are 3/16, ¼, 5/16 and ¾ in. outside diameter. Instructions as to how to anneal tubing are enclosed with the tool. The price is \$3.25 and the maker is the Esco Mfg. Co., Detroit.

## Valley Buffers and Grinders

BOTH motor and stand are finished in black enamel paint with letters in aluminum. The end plates are solid and the bearings are SKF ball, double row self-cleaning type. Each machine has a double shaft extension threaded on both ends. On one end there are two 4-in. flanges and nuts for holding the wheel, and on the other end a nut for holding the brush. These machines are made in various sizes, from ½ hp. up to 4 hp. The machines are equipped with single phase motors and come complete with starting switch. The maker is the Valley Electric Co., St. Louis, Mo.

## Eco Burning-in Equipment

THE equipment consists of a burning-in attachment and an engine stand. The engine stand is a gray iron casting and is said to be strong and substantial. The burning-in attachment is made of channel steel and cast iron. The line shaft is made of tool steel and fitted with a universal joint. It is driven by means of an electric motor through a back gear with a reduction of nine to one. Price \$300. Made by Western Mfg. Co., Oskaloosa, Iowa.

## Murrie-Ott Crankpin Tool

THIS has been designed for truck repairshops and will turn from 1 to 2½ in. in diameter. Nine cutters are furnished with this tool: 1½, 1¾, 1½, 1¾, 2, 2½, 2¾ and 2½. Cutters up to 3½ in. long can be used in this tool. Any length of cutter is furnished.

It is possible to get a close adjustment with this tool and avoid cutting away unnecessary stock. The maker is the Murrie-Ott Co., La Crosse, Wis. The price is \$36.

## J & B Wheel Puller

THIS is for the purpose of removing wheels from full-floating type axle tubes. After the flange nuts, the driving flange, and the axle are removed. The puller is placed in position over two diametrically opposite driving studs, and held down by using two of the regular flange nuts. See illustration.

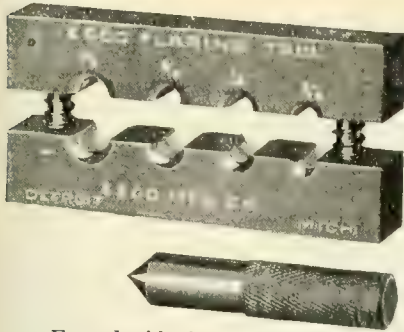
The central screw on the puller is then turned with a wrench, so that the plate is engaged with the axle tube, causing the wheel to be pulled off squarely. The list price is \$5. The maker is the J. & B. Mfg. Co., Pittsfield, Mass.

## Master Pump

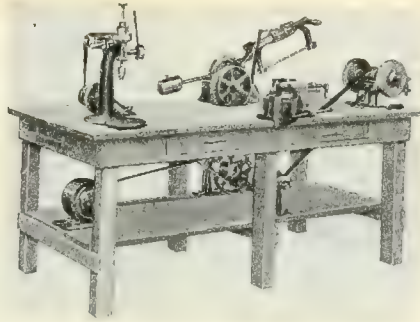
THIS consists of a two-cylinder pump bore 1¾ in. and stroke of 2 in. driven by a ½-hp. General Electric motor, mounted on a metal truck or stationary base, as desired. Running at normal speed, 500 r.p.m., this machine will deliver 2½ cu. ft. of air per minute or will completely inflate a 37 by 5 in. tire from flat to 90 lb. pressure in less than 2 min. A small expansion chamber is attached for the removal of impurities from the air. Regular equipment in addition to the pump includes 20 ft. of electric cord and 20 ft. of heavy wire bound rubber with a Schrader gage. Small nozzle is also furnished to fit the end of the hose so that the outfit may be used as a compressed air cleaner. Prices vary from \$190 for the direct current motor to \$200 for the alternating current motor. The maker is the Hartford Machine Screw Co., Hartford, Conn.



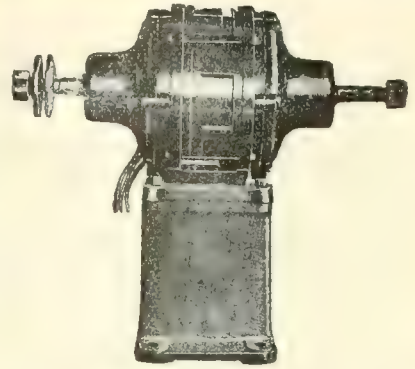
# Buyer's Department of The Commercial Vehicle



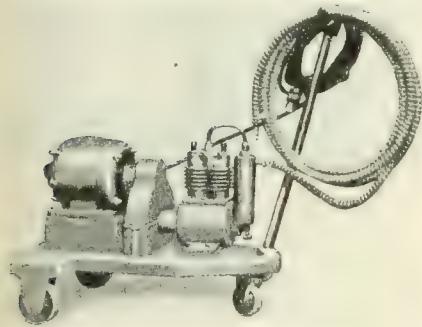
Esco double face flaring tool



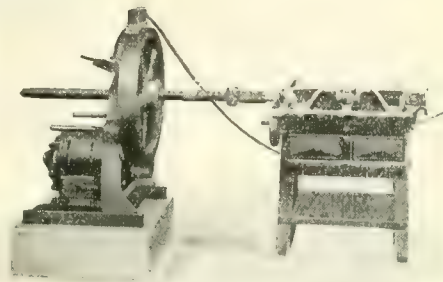
Myers work bench



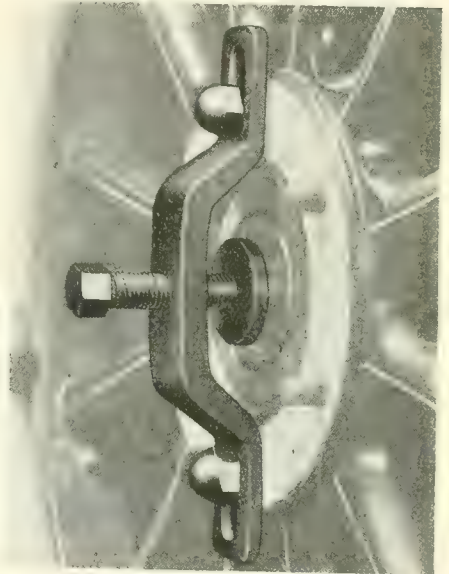
Valley buffers and grinders



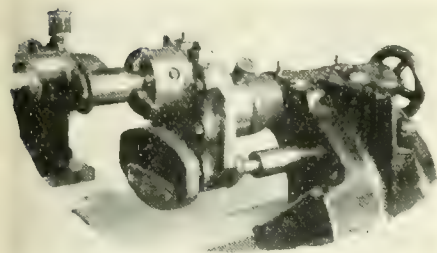
Master pump



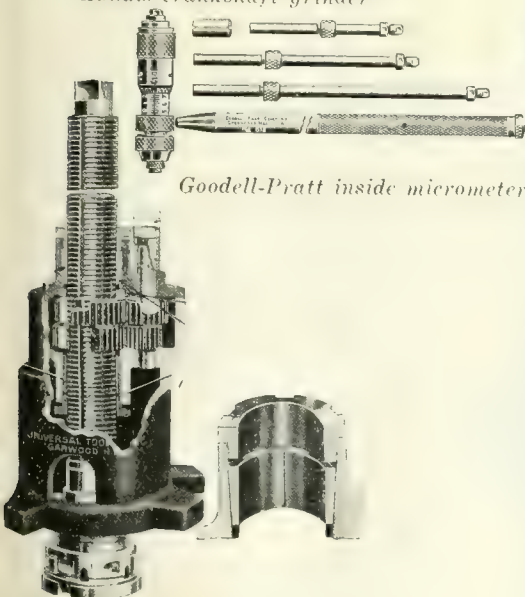
Eco burning-in outfit



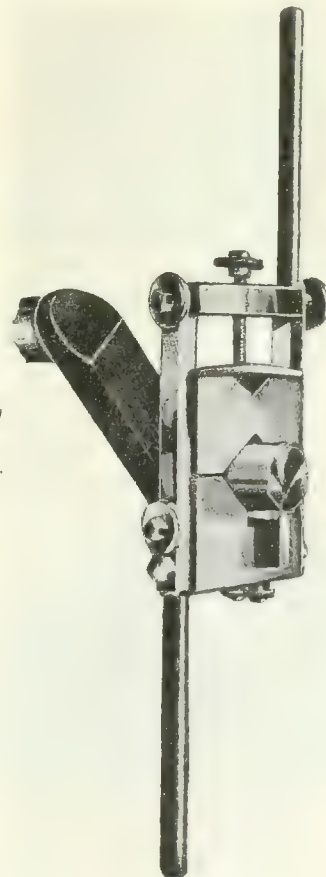
J & B wheel puller



Landis crankshaft grinder



Goodell-Pratt inside micrometer



Murrie-Ott crankpin tool



Universal grease cup wrench



Thomason piston aligner

# Buyer's Department of The Commercial Vehicle

## Ample Ground Clearance Given with Hough Mechanical Hoist

*Is Light in Weight and Is Claimed Not to Be Affected by Vibration or Temperature*

THE Hough hoist made by the Hough Mechanical Hoist Co., Chicago, works on the mechanical principle. It raises the body to a maximum elevation, yet gives ample ground clearance. When it is not in use, it extends only 3½ in. above the top of the truck frame.

This hoist works only when it is actually elevating a load. It is stated that it is not affected by the vibration of the truck nor is it affected by heat or cold.

An important feature is its light weight. The 10-ton hoist weighs only 450 lbs., the 6-ton but 340 lbs. and the light duty model 225 lbs.

The principle employed is that of leverage, utilized in a new way. The power, after it has been reduced by a set of gears, is transmitted to a shaft whose axis is at right angles to the length of the truck frame. On each end of this shaft is keyed an eccentric drum, and as this slowly revolves with the shaft it winds upon itself a steel cable, the other end of which is attached to the lower end of a curved pivoted steel arm or strut.

If it were necessary merely to pull a heavy weight upward toward the drum, no strut would be necessary. But it is necessary to transform the pull of the cable winding upon the drum into a "push," in order to push the truck body upward. The shortening of the cable as

it winds on the drum pulls the end of the strut upward, thus raising the body.

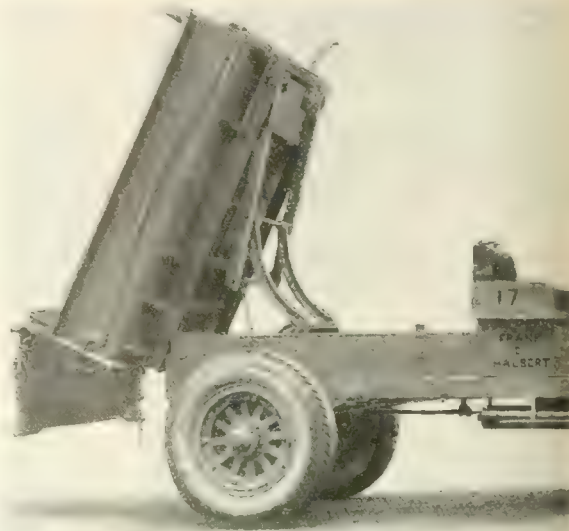
It is apparent that the heaviest load must be lifted at the beginning of the operation, and that the load lessens as the body is elevated.

As the body starts to elevate—when the most power is required—the short radius of the eccentric drum is used. As the load begins to slide, and less power is required with more speed, the long radius of the eccentric drum is employed.

### Extra Height Attained

When the drum has almost completed its revolution, and the end of the strut is pulled almost up to the drum, a curved nose on the periphery of the drum engages the curved lower end of the strut in such a way as to add a full 7 in. to the height to which the strut is raised. This 7 in., at the point at which the upper end of the strut is fastened to the body, means a large increase in the height in which the forward end of the body is raised.

When the body has been raised to its highest elevation the lower end of the strut locks firmly beneath the curved nose on the drum in such a way as to lock the body firmly in position. The weight



*Side view of Hough hoist, showing method of elevating body*

of the body is directly above the center of the shaft on which the drum is fastened, so that there is no tendency to rotate the drum.

A device is fitted on the hoist which throws automatically a hoisting mechanism out of gear when the maximum elevation has been reached. The positive mechanical action of the hoist enables it to hold the body at any elevation.

By reversing the elevating transmission it is possible to lower the body to the height desired.

A shift lever which controls the hoist is conveniently located near the driver's seat. When the driver throws this lever, the gear on the propeller shaft of the hoist is engaged with the worm gear, which transmits the power through the combination of gears to the shaft on each end of which are keyed the eccentric drums.

The power is carried from the power take-off on the truck transmission to the elevating transmission by a straight line shaft drive passing beneath the truck frame cross-member.

Drop forge heat-treated, alloy steel gears are used. The worm and worm shaft, which are integral, run upon a double row of large ball bearings. Other gear shafts run upon dust-proof inclosed bronze bearings. All gears are inclosed in a dirt-proof metal transmission case and run in an oil bath.

The prices of the hoist, including the standard power take-off, are as follows:

Size	Price
10 tons .....	\$500
6 tons .....	425
3 tons .....	350



*Complete elevation, after drum has made full turn. The strut is firmly locked with the nose of the drum, no rotating influence exerted on drum by weight of body*

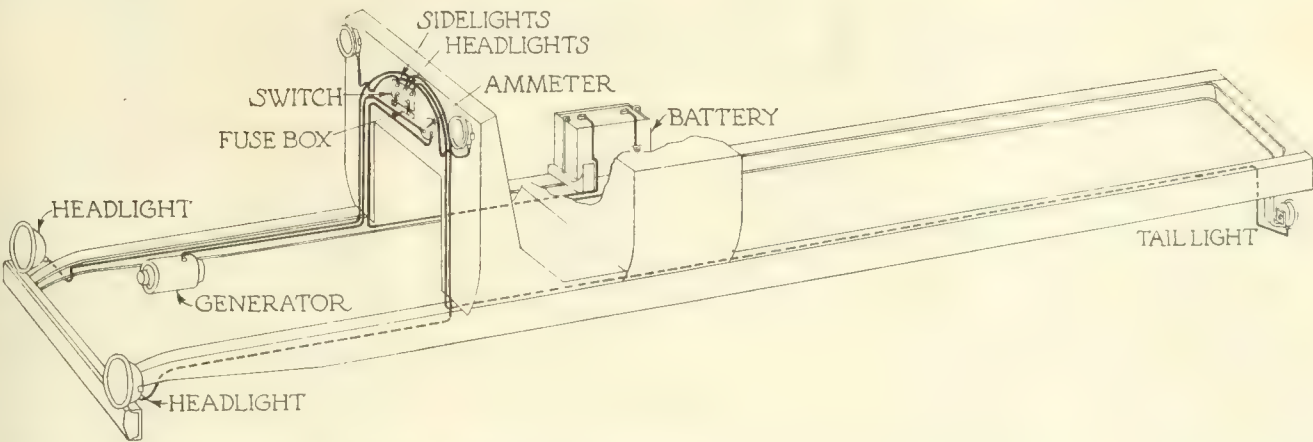


*Showing eccentric drum making three-quarter turn, long end of radius now being employed, and curved nose about to engage end of pivoted strut*



# Motor Truck Electric System Wiring Diagrams

38—Lighting Unit on Moreland Trucks



Wiring system used on the Moreland 1921 truck models. This is not standard equipment, however, and when it is installed it is laid out as per the accompanying illustration

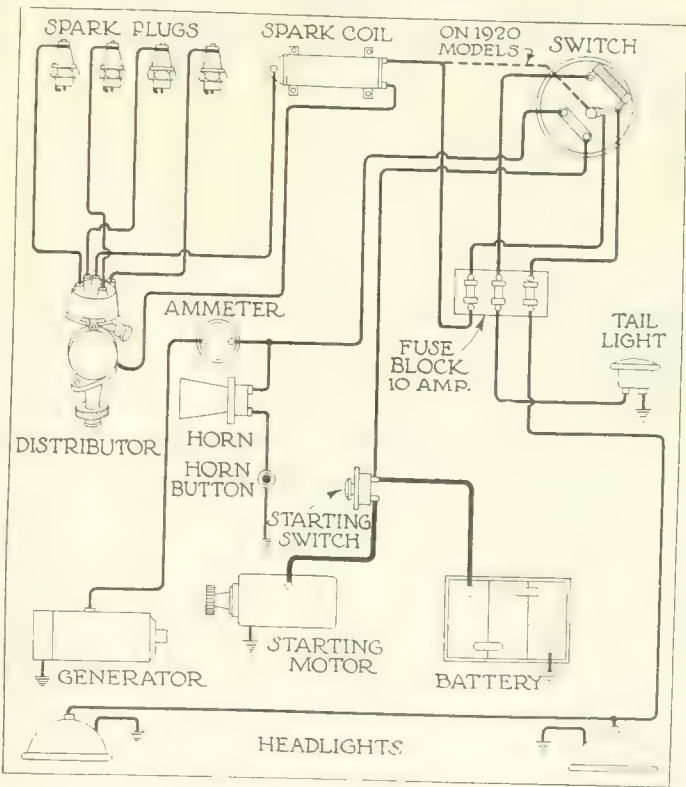
## These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

The following diagrams have been published in THE COMMERCIAL VEHICLE.

1920	
1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting.....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15
1921	
12—Maxwell, Lighting.....	Jan. 15
13—International, Starting and Lighting.....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 15
17—Reo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Apr. 15
19—Stewart, Starting and Lighting.....	May 1
20—Kelly-Springfield, Starting and Lighting.....	May 15
21—Riker, Starting and Lighting.....	May 15
22—U. S., Starting and Lighting.....	June 1
23—Wilcox, Lighting.....	June 1
24—Pierce-Arrow, Starting and Lighting.....	June 15
25—Republic, Starting and Lighting.....	June 15
26—Parker, Starting and Lighting.....	July 1
27—Noble, Starting and Lighting.....	July 1
28—Oneida, Starting and Lighting.....	July 1
29—Oshkosh, Starting and Lighting.....	July 15
30—Knox, Starting and Lighting.....	July 15
31—Master, Lighting.....	Aug. 1
32—Watson, Starting and Lighting.....	Aug. 15
33—Service, Lighting.....	Aug. 15
34—Packard, Starting and Lighting.....	Sept. 1
35—Tiffin, Starting and Lighting.....	Sept. 1
36—Napoleon, Starting and Lighting.....	Sept. 15
37—Dorris, Starting and Lighting.....	Sept. 15
38—Moreland, Lighting.....	Oct. 1
39—Northway, Starting and Lighting.....	Oct. 1

39—Starting and Lighting Unit on  
Northway Trucks



Wiring diagram of the starting and lighting system used on the 2, 3½ and 5-ton Northway trucks



# The Fleet Owners' Forum

## Warns Against Leaving Dirty Oil in Crankcase

To the Editor, COMMERCIAL VEHICLE:

Appreciating the interest you take in promoting economical operation of commercial vehicles, I feel justified in making some comment on the subject.

The statement that dust is more costly than gold seems absurd but nevertheless it is true, when that dust is left in the crankcase of a motor truck. Many operators realize the importance of changing the "crank case" oil frequently, but unfortunately many still fail to grant the necessity of replacing this oil every 500 or 700 miles.

It is almost universally agreed that grit and dirt constantly find their way into the crankcase and upon being mixed with the oil constitute an abrasive, gradually but surely wearing away the engine parts. It is also generally agreed that it is impossible, even in summer weather, to keep the unused end of fuel from entering the crankcase and diluting or thinning the lubricant. As cool weather approaches, motor vehicles must be run on a richer mixture and the primers or choke must be used more, with the certain result that improper lubrication will be common rather than the exception, if the present practice is followed.

To say nothing at all of the loss in power, which is sure to result from diluted crankcase oil which is incapable of sealing the "piston to cylinder" clearance, making possible maximum compression, there is an unrecognized mortality of internal combustion engines due to using dirty, gritty, diluted oil. I know you would be interested in knowing the results of a test which was made by a prominent automobile association to determine how long oil could safely be used. The test was essentially as follows:

An engine in perfect mechanical condition, having the proper piston clearance, was supplied with fresh oil and run for a period of 30 hrs. The oil was then changed and the engine run for another period of 30 hrs. It was then torn down and the cylinders measured with the most accurate recording instruments known and showed absolutely no wear.

The same engine was reassembled and instead of using clean crankcase oil, the engine this time was lubricated with used oil taken from another engine. This oil was left in the crankcase during the test run of 60 hrs. The engine was again

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

torn down, cylinders measured, and the recording instruments showed a wear of .005 in.

It seems to me this test tells its own story and if modern vehicles are to be run at a minimum operating expense, more care must be taken in changing oil frequently.—I. E. NEWMAN, S. F. Bowser & Co., Fort Wayne, Ind.

## Co-operative Delivery

ONE of our readers is interested in getting information on co-operative delivery. He is also desirous of systematizing his department store deliveries.

We are glad to help him and are particularly pleased that he has made this effort to abolish inefficiency in his delivery department.

Can't we help you as well?

## Let's Hear from You

## Oil Pumping Not Corrected When Cylinders Are Worn

To the Editor, COMMERCIAL VEHICLE:

My engine pumps oil after having tried various kinds of so-called leakproof piston rings. The cylinder walls are not scored or burnt. Would beveling the third and fourth rings have any effect in this case, and if so, which way should the bevels be placed?—H. WHEELER, Mt. Vernon, N. Y.

The installation of new rings will not correct oil pumping if the cylinders are worn, and there is perceptible ring travel wear. If you will remove the pistons and micrometer the cylinders carefully you will undoubtedly find that they are worn out of round. The only correct way to overcome the trouble is to regrind or rebore the cylinders and fit new pistons and rings.

The kind of piston ring used will do very little to correct oil pumping if the cylinder wear is excessive and it is hardly reasonable to expect that a ring can compensate for an out of round condition and perceptible ring travel wear.

## Co-operative Delivery Interests This Department Store

To the Editor, COMMERCIAL VEHICLE:

We would appreciate it very much, if you would send us a list of blank forms, that are now being used by truck owners to check up mileage, gasoline, tires, tubes, and repairs on trucks and also a check up which will permit the ascertaining at the end of a month the number of packages carried, so as to arrive at the average cost per package.

We would like also forms used by department stores for keeping a record of packages sent out, the addresses to which sent and the disposition of the packages.

Have you any information available on the co-operative delivery system? Do you know of any co-operative system, that has been run successfully, where several stores have combined their deliveries and pro-rated the expense?—F. D. M., Hills, McClean & Haskins, Binghams, N. Y.

You will find the forms used in THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks will take care of the records necessary for department store works. These may be purchased from the U. P. C. Book Co., 243 West Thirty-ninth Street, New York.

In regard to your question on the co-operative delivery system we might refer you to our April 15, 1920, issue, pages 178 and 179, and our July 1, 1920, issue, pages 350 and 357. Both stories cover the installation of trucks and the laying out of the garage for co-operative delivery. The particular company is the Clearing House Parcel Delivery Co., Boston.

Two of the most recent stories appearing in THE COMMERCIAL VEHICLE treating of a concern making co-operative department store deliveries as a business were published in the May 1, 1921, pages 212 and 213, and the June 1, 1921, pages 270 and 271, issues. These two stories cover the operation of trucks owned by the Eleto Co., New York City, which handles all deliveries for Lord & Taylor and James McCreery & Co., two of the largest department stores in that city.

We might also refer you to our Jan. 15, 1919, issue, pages 5 to 8, which cover department store contract delivery by the Kerr Dry Goods Co., Oklahoma City Okla.

Theoretically, the co-operative delivery system is of great economic benefit in that it eliminates waste. It prevents a dozen delivery wagons or trucks each with only a partial load, delivering on the same block during the same day.



when one fully loaded vehicle with, say, one-twelfth the number of men would deliver the same amount of goods.

Briefly outlining the story connected with the Clearing House Delivery Co., there are two kinds of co-operative delivery as follows:

1. By merchants, farmers or others combining and agreeing to turn over the delivery work to one concern owned and controlled generally by the several individuals, firms or companies.

2. The establishment of a concern which will agree to deliver packages or bundles of several stores for a certain rate per package or value and contract to do this work over specific periods. In this case, the delivery concern need not be financially backed by the concerns whose products it delivers, but on the other hand be a separate company whose sole business is to deliver the packages for a profit.

Co-operative delivery concerns which have failed in the past, have done so mainly through ignorance of the fundamentals peculiar to that line of package delivery. Reasons for these failures may be summed up briefly under ten separate heads as follows:

1. Lack of a complete operating knowledge of the types of vehicles used and their repair and maintenance.

2. Lack of knowledge on the part of the man in charge of the co-operative delivery in regard to the interior handling of packages, including routing, sheet writing and other necessary steps in keeping a record of the goods handled.

3. Disinclination on the part of merchants to lose the advertising value otherwise secured when operating their own vehicles.

4. Too low truck delivery prices for various sizes of packages to cover slack periods of the year.

5. Inability to take care of the fluctuating peak loads when packages for a large number of concerns are handled.

6. Jealousy on the part of different members of a co-operatively-owned company, with one member feeling that he is getting a poorer service than his colleagues.

7. Delivery of the most difficult packages to a co-operative company by concerns entering into the co-operative agreement, with the delivery of the less difficult packages made by the individual companies separately.

8. Improper valuation of individual former delivery equipment when turned in to help defray the expense of a new co-operative equipment.

9. Lack of establishment of a central sorting station in which packages can be handled economically.

10. Inability to solve the C. O. D. problem without loss to the individual concerns.

## Reader Wants Cost Figures More Fully Explained

To the Editor, COMMERCIAL VEHICLE:  
In THE COMMERCIAL VEHICLE, issue of August 1, page 18, there is a story entitled "The Cost of Keeping It Moving."

A part of the heading of this story states that the truck cost \$.1773 per mile to run. A chart of operating expenses is shown in the accompanying illustration. However, on looking over the chart one finds that many items have been left out, to wit, cost of body, cost of equipment, cost of grease and waste, depreciation on chassis, depreciation on equipment and mechanic's time. This last may have been included under the item repairs, so that I may be wrong stating that no allowance has been made for it. The other items are not included in any way and, if added, would bring the per mile cost of running a truck to well above the stated amount.

There is another matter on which I am seeking information. A short time ago I purchased from the U. P. C. Book Co. a number of Monthly Cost Sheets, which I have been in the habit of using for making transportation surveys. At item thirteen of the sheets as purchased,

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

It states that the average commercial ton-miles are obtained by adding items eleven and twelve. I do not see how one can arrive at ton-miles by adding average miles and average tons, as the method of discovering ton-miles is to multiply the average tons and the average miles.

On another of the cost sheets, item thirteen is stated as being the product of item eleven times item twelve, divided by two. I should like to have you explain to me why sums of items eleven and twelve when multiplied should be divided by two. This, of course, may have been done because it was pre-supposed that a truck would be empty while covering one leg of the trip, but there are many industries, such as the laundry industry, carpet cleaning industry and others, where the trucks are loaded both going and coming and item thirteen is then very confusing to those keeping records.

I would appreciate very greatly any attention that you may give these requests, and hoping to hear from you at your convenience.—E. W. ROESCH, Transportation Engineer, New York Edison Co., New York City.

The items which you list are not omitted from these cost records although they would have been given in more detailed form if possible.

The cost of the body of the truck and the cost of the equipment of the truck are lumped in one sum given under the head of chassis, namely \$1,515 and are, therefore, included. The cost of grease and waste and the mechanic's time is included under maintenance charges in the item of repairs, overhauling and painting. When the cost of maintenance and repairs is estimated on the mileage basis, it is reckoned to include such items as grease, waste and mechanic's time, as well as spare parts, tools, etc. In the

same way under fixed charges the depreciation on the chassis, depreciation on body and depreciation on equipment are all included in the \$.0126 per mile charge for depreciation. When depreciation is estimated on a mileage basis it includes all parts of the truck except the tires which are estimated separately under maintenance charges. All cost items are included in these cost records therefore and you may take the final figures as accurate.

With reference to your third paragraph some of the early sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System appeared with an error in item 13 in that the average commercial ton-mile was given as item 11 + item 12. This should have been item 11 × item 12 ÷ 2 as given in the newer sheets. As you surmised the result of multiplying the average miles per trip by the average tons per trip is divided by 2 in order to allow for the unloaded run. This final figure is not accurate when a truck is constantly dropping and picking up parts of its load. But we believe it is more nearly accurate than would be the case if the total were not divided by 2. In any case the advantage of cost records lies principally in the comparison of these records over a period of time. Hence it is not so important that the method of estimating the ton-mile be absolutely accurate as that it be uniform in all cases, for purposes of comparison.

## Has Trouble Reaming Wristpin Bushings

To the Editor, COMMERCIAL VEHICLE:

Why is it that wristpin bushings when reamed have high spots longitudinally? We have tried three different types of expansion reamers with no better results. To get anywhere near a good fit the bushings must be scraped.

How are the Keystone reamers sharpened?—JAMES HILL, Evanston, Ill.

1. You are trying to take out too much metal at one cut. The reamers must be very sharp for brass or bronze and set to take a very light cut. It is well to begin with as small a cut as .001 in. After proficiency is attained, this may be increased.

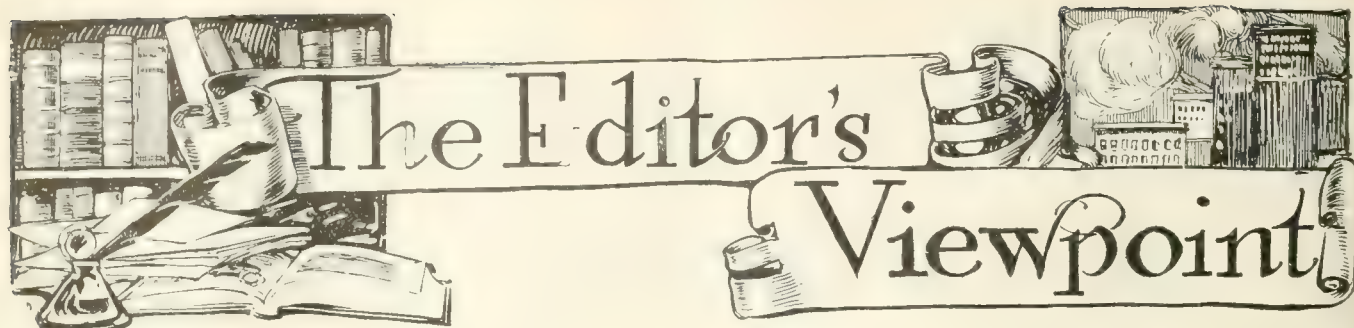
2. These reamers are ground in special jigs by tool experts. We recommend that the work be given to them.

## A Coat of Solder Renews Worn Bushings

To the Editor, COMMERCIAL VEHICLE:

When overhauling engines, if the piston pins are found to fit the bushings too loosely, they can be made as good as new by pressing the bushings out of the connecting rods and applying a thin coat of solder to the outside of the bushing, then pressing it back into the connecting rod. It is a good plan to bevel the edges of the hole in the rod slightly with a round file so it will not shave off too much of the solder. The hole in the bushing may be too small now and need reaming the same as a new bushing.—READER.





## The Driver and the Public

**A**S motor trucks and motor truck operators take over an ever-increasing share of the nation's transportation they have their battles to fight. All new methods and inventions which are at all widely adopted meet with hostility. And the motor truck is no exception.

Some of the hostility is interested and some just due to misinformation and ignorance. The first must be fought. But the latter can be and must be conciliated and corrected, if we are to smooth the path of the industrial motor truck.

The last thing we want to do is to perpetuate or even augment the present hostility. But many operators are doing that very thing, through carelessness and sometimes through ignorance.

The motor truck—particularly the motor truck of the larger type—is not decorative. It is not particularly pleasing to the eye. Moreover, motor trucks in city streets are anathema to the householder, because they are noisy and because they have killed and maimed children left to run at large in the streets.

The truck on country roads is just the same. Farmers and rural communities are instinctively hostile to everybody's motor truck except their own, if they have one—sometimes justly, but more often unjustly. It has become almost a religion with them that trucks tear up their roads. Let a bridge break down, a road wash out or a section of road develop holes and bumps—due to a faulty foundation—and everybody in the local community who does not operate trucks will tell you that trucks are at the bottom of the trouble.

There are many reasons for this hostility. Some of it is deliberately fostered by interests hostile to trucks. Some of it is founded on facts which cannot be helped. But a good deal of it is due to a condition which can and must be corrected. That is the careless, inconsiderate, aw-go-to-h—l attitude of many of the drivers of those same trucks.

The fact is that drivers of trucks to a very large extent control public opinion on trucks. The drivers do not realize this. That is only natural. But owners and operators do not realize it, either—and that is dangerous. For upon public opinion very largely rests the question of whether motor trucks are to slide smoothly into playing a very large part

in national industry, or whether they are to win their way to that important position over a road full of bumps of hostility and anti-truck legislation.

A very large part of the public drives passenger cars. And a very large part of the public has had cause to curse the motor truck for a road hog and a general nuisance. This is one big factor of hostility which can be eliminated.

A very large part of the public hates and fears the truck because it believes the truck has made the streets unsafe for children. The truck looks unwieldy, and in the eyes of many mothers it is a juggernaut, thirsting for the blood of children. This is not exaggerated. It is a fact. But it is another fact which can be eliminated.

If every driver of a motor truck would make it a point to keep over on the right side of the road and always allow the swifter passenger cars to pass at once, instead of after ten minutes of frantic honking; if every driver would picture to himself his own feelings if he ran over a child, and drive accordingly where there was any danger of doing this, it would have an enormous influence on public opinion and would go far to reduce the present active hostility toward the truck.

Every passenger car owner honestly and sincerely believes that the roads were built for him. They always were his until the truck came along. Therefore, the truck is an interloper and a dangerous and inconsiderate one, and should be discouraged accordingly. Moreover, the truck destroys the roads—says the passenger car owner—and not only makes driving unpleasant, but increases the taxation he has to pay to keep those roads in repair.

Your driver cannot be expected to realize these things for himself. He feels the hostility, but it only makes him defiant and he gets a certain amount of amusement out of making himself disagreeable and defying public opinion.

This must stop. It is the duty of every operator to talk very seriously to his truck drivers and explain to them the necessity for careful driving and courteous and considerate treatment of other users of the roads. More, it is the duty of every truck owner and operator to go further and to see that his drivers *are* careful and considerate by making it unpleasant for them when they are not.



## To Reorganize P. O. Transportation

**Head of Motor Haulage Co. to Assist Postmaster General Hays in Work**

WASHINGTON, D. C., Sept. 16.—Reorganization of the motor transportation system in the Post Office Department has been authorized by Postmaster General Hays. He has designated Ralph H. Matthiessen, president of the Motor Haulage Co., New York City, as a special assistant in charge of the Bureau of Motor Vehicle Transportation, which will be established. It is the purpose of the Postmaster General to increase the efficiency of deliveries by motor trucks and to reduce the cost of transportation.

Matthiessen will confer with the automotive experts in the employ of the postal service and with manufacturers supplying trucks and cars to the Government; he will organize the repair shops and expand their facilities through employing expert mechanics and garage-men. A cost accounting system will be installed and the latest labor-saving devices will be installed in the garages throughout the country.

There are now 271 cities in which Government-owned motor vehicles are operated, maintaining over 3600 motor vehicles. Its operating expenses annually amount to about \$15,000,000. There are nearly 5000 supervisory officials, clerks, chauffeurs, mechanics, etc., employed in this class of service.

The motor vehicle service extends only to mail service within cities, such as collection and delivery of mail and transportation of mail from one point to another within cities. Rural carriers and contractors on star routes in rural territory operate their own motor vehicles.

### Price Changes

HARTFORD, WIS., Sept. 24.—The Kissel Motor Car Co., this city, will reduce its truck prices on Oct. 1. These reductions will range from \$600 to \$1,000. The truck models affected by the reduction are \$800 on the general utility with a capacity including the body of 4200 lb., formerly \$2,775, the new price \$1,975. The freighter model is reduced \$600 from \$3,475 to \$2,875. The heavy duty model is reduced from \$4,475 to \$3,675 and the Goliath model from \$5,085 to \$4,085.

NEW YORK CITY, Sept. 17.—The Standard Steel Car Co. which now owns the Vim Truck has announced the following new prices:

Model	Old Prices	New Prices
Vim 29.....	\$1,375	\$1,050
Vim 30.....	1,550	1,175
Vim 31.....	2,475	1,975

OTTUMWA, IOWA, Sept. 17.—A general reduction in the prices of Bell trucks, effective at once, has been announced by the Bell Truck Sales Corp., sales division

## TRUCKS MUST SERVE ALL NATIONALITIES OR NONE IN CALIFORNIA

SAN FRANCISCO, Cal., Sept. 17.—The motor truck knows no distinctions of nationality, according to the California State Railroad Commission, which made its momentous decision when Kiso Yasunaga applied for a permit to establish a motor truck line as a carrier of farm produce between San Jose and Oakland, Cal.

"I want to serve Japanese farmers only," said Yasunaga, in his petition.

"You can have the permit, but only on condition that you serve any and all who offer traffic," replied the commission. "You will have to accept business to the capacity of your line without discrimination in favor of Japanese or any other nationals."

Yasunaga accepted the amendment to his petition and took the permit.

Permits, however, are being issued for special lines of business, if not for racial classes. Truck operators are allowed to handle only fish, only vegetables, only furniture, only rice, sugar, corn, barley, or any other individual commodities, when they specify their desires in their applications for permits.

of the Iowa Motor Truck Co. The prices follow:

	New Prices	Old Prices
Model M 1 ton.....	\$1,495	\$1,650
Model E 1½ ton.....	2,100	2,250
Model O 2½ ton.....	2,750	2,950

BUFFALO, Sept. 23.—The Atterbury Motor Car Co. of Buffalo announces new prices on its various truck models, effective Oct. 1. The prices are F. O. B. Buffalo and do not include the United States war tax.

	New Prices	Old Prices
1½ ton.....	\$2,475	\$2,775
2½ ton.....	3,175	3,475
3½ ton.....	3,975	4,175
5 ton.....	4,975	5,575

HARTFORD, WIS., Sept. 26.—Reductions ranging from \$600 to \$1,000 on its line of trucks are announced by the Kissel Motor Car Co. The prices follow:

	New	Old
Utility model 1½ ton....	\$1,975	\$2,775
Freighter model 2½ ton.....	2,875	3,475
Heavy duty model 4 ton..	3,675	4,475
Goliath model 5 ton.....	4,085	5,085

DETROIT, Sept. 16.—Price reductions averaging 15 per cent on its entire line were made by the Standard Motor Truck Co. to-day.

The new Standard prices are:

	New	Old
Model 1-K 1-1½ ton.....	\$1,800	\$1,950
Model 1-6 2½-3 ton.....	2,000	2,100
Model 66 3½-4 ton.....	2,800	3,000
Model 5-K 5-7 ton.....	4,400	5,250

DEFIANCE, OHIO, Sept. 16.—The Defiance Truck Co. has made price reductions ranging from \$200 to \$375. The 1-ton model now will sell for \$1,695 and the 2-ton for \$2,275.

## Ten States Add Fuel Tax Levy

**Measure Advanced in Nine Other States—Annual Burden of \$1,200,000**

NEW YORK CITY, Sept. 19.—Ten States, bringing the total to fourteen, have added taxes on gasoline consumption during the 1921 sessions of their legislatures. When the present year 1921 began the laws of four States imposed taxes upon gasoline used in motor vehicles. These were as follows: Colorado, 1 cent per gallon; Kentucky, 1 cent per gallon; New Mexico, 2 cents per gallon; and Oregon, 1 cent per gallon.

To-day, after the legislatures of forty-two States have convened and adjourned their 1921 sessions, ten more States have been added to the list as follows:

Arizona .....	1 cent per gallon
Arkansas .....	1 cent per gallon
Connecticut .....	1 cent per gallon
Florida .....	1 cent per gallon
Georgia .....	1 cent per gallon
Montana .....	1 cent per gallon
North Carolina....	1 cent per gallon
Pennsylvania ....	1 cent per gallon
South Dakota....	1 cent per gallon
Washington .....	1 cent per gallon

In the ten States that have been added to the gasoline tax list there were 151,771 trucks. On the conservative assumption that a truck uses 800 gal. of gasoline a year, it is apparent that in these States motor trucks consumed little over 121,000,000 gal. of gasoline last year. On this basis of consumption the yearly burden for truck owners in those States will be increased at least \$1,200,000 by the gasoline taxes enacted.

One defect in the gasoline tax is that no exemption or reduction is made in the taxation of fuel used in commercial pursuits. Twenty gallons of gasoline used in transporting potatoes to the market must pay the same rate of tax as 20 gallons consumed in transporting people to a baseball game.

### New Bosch Co. Launched

NEW YORK CITY, Sept. 16.—The Robert Bosch Magneto Co., Inc., has opened offices in the Goodyear Rubber Co. building, this city. Otto Heins, who was president of the Bosch Magneto Co. before it was taken over by the alien property custodian and reorganized into the American Bosch Magneto Corp., is president of the new corporation. The new company is going ahead with the manufacture of magnetos under the old patents. Though no factory site has been selected, the company is considering several plants already built. In addition to the manufacture of magnetos the company will also manufacture spark plugs, starting and lighting systems, as well as other electrical devices. The company also claims to have a new Bosch invention for low price motor vehicles. This is a combination battery and ignition system.



## 6-Month Test to Settle Bus Controversy

### Rockford to Give Free Rein to Buses—Trolley Faction Wants Restrictions

ROCKFORD, ILL., Sept. 19.—It is conceded by officials in this city that the trolley car and motor bus controversy will finally be settled by the elimination of one of the two systems of transportation. Both cannot survive; one or the other must fall.

The latest step taken by representatives of the interurban lines into this city is a threat of suspending the operation of the street cars and also of abandoning the interurban lines. They are protesting the unrestricted operation of the motor buses introduced by Thomas R. Fay. Bus operation has cut heavily into the earnings of the electric lines, so much in fact, that the City Council has been asked to give the traction lines preference and to keep the motor buses secondary. In their arguments for this plan, the traction interests have promised a 5-cent fare within the near future or as soon as the company was able to earn 6 per cent for stockholders. Furthermore, the traction interests have offered to operate motor buses in sparsely settled sections to connect with the street cars, giving a transfer service.

The City Council has under consideration a proposition submitted by the Fay company to operate buses over the entire city for six months in order to permit a test of what the vehicles can do when given free rein. This may be finally approved. At the end of that period, the council will be in a position to determine which system of transportation should go.

### Detroit Bus Line Grows

DETROIT, Sept. 17.—Accomplishments of the Detroit Motor Bus Co. for the first full year of operations have exceeded expectations. The first line was opened June 11, 1920, with six buses covering a four-mile route. Gross earnings now are averaging \$3,500 daily, compared with \$500 the first day.

During six months and 20 days of 1920, gross earnings were \$250,000 for six months ended June 30, 1920. Gross earnings for 1921 were \$324,830 and for July, \$108,460.

### Law Delays Bus Purchase

DETROIT, Sept. 16.—Purchase by the city of trolley buses has been laid over until after the October election to permit an amendment to the charter. The present charter will only permit the railway commission to purchase the regular type of trolley car. An amendment to provide for the purchase of gasoline buses or other types of trackless trolleys will be substituted. A three-fifths vote will be necessary to pass the amendment.

### Duplex Develops Bus Business

DETROIT, Sept. 19.—Operations at the Duplex Truck Co. factory, Lansing, have

## MUST HAVE TWO DOORS ON OHIO BUSES

COLUMBUS, Ohio, Sept. 20.—Motor buses, operated between two Ohio municipalities, and which are now classed as public utilities and come under the jurisdiction of the Ohio Utilities Commission, must have two door openings before Dec. 1. This is the latest ruling of the utilities commission. The commission permits owners until Dec. 1 to comply with the regulation.

increased to a 50 per cent basis through the development by the company of the possibilities of its 1½- to 2-ton chassis for passenger bus service in meeting transportation problems in many parts of the country.

Though not confining itself to the production of this one chassis exclusively, the company is going after this business aggressively and declares that with present prospective business taking form it will soon be back to practically 100 per cent operation.

The business is sought out by its investigators in the field operating under the vocational sales plan. Where an opportunity for bus transportation is reported the dealer in that territory is asked to investigate further. If conditions are regarded as favorable for actual bus trial, one or more are put into service and the possibilities of the proposed line tested out.

Recent business developed by the company includes the sale of 16 additional buses to a fleet of 14 which has been operating in Washington, D. C. A line is operated between Elkhart and South Bend. Trial buses are in operation in a number of cities with excellent prospects of developing permanent lines.

### Motor Tax Taken Out

WASHINGTON, Sept. 17.—New recommendations made to the Senate Finance Committee by Secretary of the Treasury Mellon in reference to taxation do not contain his original proposal for a Federal tax on automobiles. So much opposition to this plan developed that it has been definitely abandoned. He urges repeal of the excess profits tax effective as of January last and of the tax on capital stock for 1922, which was payable July 1 last. Reduction of the high income surtaxes to 25 per cent also is urged. The loss in revenue by repeals and reductions would be partly offset by an increase from 10 to 15 per cent in the tax on the net income of corporations.

### Governor Backs Gas Tax

NEW ORLEANS, Sept. 20.—Governor Parker has announced that he will recommend a sales tax of one cent a gallon on gasoline to the special session of the Louisiana legislature now in session. The constitution permits a two-cent tax for road purposes.

## Motor Bus Hit Hard in Indianapolis

### \$10,000 to \$20,000 Bonds and \$26 to \$50 License Fees in New Ordinance

INDIANAPOLIS, IND., Sept. 30.—The motor bus has received a severe blow here with the introduction of an ordinance in the City Council which will drive them off all the streets on which street cars are operating, will require the filing of bonds ranging from \$10,000 to \$20,000 and a license fee ranging from \$26 to \$50 a year. There is every indication that the City Council will pass the ordinance.

The ordinance as it was drafted and was introduced, would prohibit passengers riding on fenders or running boards or sitting in such a position as to have any part of their bodies extend more than 6 in. from the outside of a machine. Drivers would have to be free from serious physical defects and would be barred if they had ever been convicted of certain violations of traffic or motor vehicle laws. Violation of the ordinance would carry a fine of \$300 and imprisonment up to 180 days.

The question of bonds is perhaps the most vital one. Heads of some of the large casualty companies here say that the bigger companies of this sort almost refuse to take business of this nature. In some companies it is stated that bonds will be written but there must be sufficient collateral to protect the bond, and the underwriters say that even this is not satisfactory because of the liability for more than one accident in a short period of time, it being possible for almost any accident to wipe out the collateral.

Motor bus drivers here are perfecting a strong organization and have widespread support in the western and southern parts of the city here that are most prevalent and plan to fight the ordinance both before its passage and in case it is passed to take the question to the courts.

### Toronto Tries Buses

TORONTO, ONT., Sept. 19.—The City Transit Commission, which has recently taken over the trolley lines, has begun experimentation with trackless gasoline propelled motor buses for use in some sections of the city. A bus of the Fifth Avenue type and a Tilling-Stevens vehicle of the type used on London streets have been procured and will be tested out by the Toronto Commission.

### New Taxicab Co. Organized

INDIANAPOLIS, IND., Sept. 17.—Harry B. Ward, A. C. Metcalf and Walter Lieber have organized here the Checker Taxicab Co. The company has been in process of organization for some time and has just been incorporated with the Secretary of State.



## New Firm Will Sell Reimported Trucks

### Slough Trading Company Formed to Dispose of 1,000 Through Local Dealers

NEW YORK, Sept. 16.—The Slough Trading Corp. of America has been organized as representative in the United States of the Slough Trading Corp., Ltd., of England, to dispose of approximately 1000 former American Army trucks purchased of the allied governments and sent here for re-sale. W. O. Crabtree, who has been well known in New York for several years as truck dealer, is general manager of the corporation which is seeking dealer representation throughout the United States.

The trucks include Mack, Pierce-Arrow, White, Packard and Riker and range in capacity from 3½ to 5 tons. They will be sold as reconditioned vehicles at approximately one-half the list price of similar new trucks.

The Slough Trading Corp. of America succeeds previous representations of the British company. It will handle only the distribution of trucks, selling through local dealers in New York as elsewhere.

Crabtree makes no claim that the trucks are "as good as new," stating frankly that some have been operated and others have suffered sufficient deterioration in shipment and storage to necessitate reconditioning.

## Concrete Road Reinforced With Steel

PITTSBURG, CAL., Sept. 20.—Concrete reinforced with steel is being given a 6-months' try-out on a half-mile stretch of road near here. The road was built by the Columbia Steel Co., of this place, and is being tested especially to get figures on its ability to withstand motor-truck traffic. Results of the tests will be known about the end of next February.

## Texas Jobbers Start Truck Line

AMARILLO, TEXAS, Sept. 19.—The Amarillo Jobbers and Manufacturers Association has inaugurated a motor truck line between this city and Perrytown on the North Plains. The distance between the two places is some eighty miles and the truck line, consisting of daily service each way, will supply the retailers in Perrytown and two intervening towns with products of the wholesale houses here. The Amarillo jobbers have figured that the truck line is as efficient as a railroad and that the expense of operation will be less. The line has been in operation for some time and has proved highly satisfactory. Perrytown has found a market for its stuff through the truck line.

It is being planned to open a half dozen truck lines out of Amarillo connecting with other towns on the plains next spring. The plains country is as

## THIS LOAD OF "JACKASS" HAD A REAL KICK

RED BLUFF, Cal., Sept. 23.—"There's a truck down here with a load of 'jackass.'"

This message came over the telephone recently to District Attorney William J. Cheatham, of Tehama county, from some one in Los Molinos, Tehama county. Now "jackass," in Northern California, is the generic name for all kinds of "overnight" liquor. Wherefore, City Marshall Frank Montgomery, of Red Bluff, was summoned hurriedly, and, gathering a posse consisting of Constable Harry McGovern, Mr. Cheatham and several others, the minions of the law, with visions of bootleggers running rampant, tore through the night to Los Molinos.

There they found the vehicle, a 1-ton truck, and in it the "jackass," but it was of the kind that carries a perennial "kick," never obtained from alcohol. The driver of the truck, who was transporting the mule, denied the latter's alcoholic content, and offered to allow the officers to climb into the truck to search the animal. They didn't.

level as a billiard table and the Amarillo jobbers believe the truck lines will solve their problems of reaching the surrounding territory in an economical and satisfactory manner.

Plainview and Lubbock, other jobbing centers on the Panhandle plains are contemplating the establishment of motor truck lines to take the place of the railroad connection which is sadly lacking.

## Indiana to Cut Road Expenses

INDIANAPOLIS, IND., Sept. 21.—With the completion of plans for the construction of a large number of gravel and stone roads on sections of the state highway system, state officials have begun the movement to give such roads preference to roads of hard surface type. The change in policy is the result of the preference on the part of the Governor for this type of road wherever possible, in order to cut expenses of road construction. The plan does not affect the trunk lines of the state highway system which will be hard surfaced, but affects all secondary routes. The state commission is endeavoring to obtain a 50-ft. right of way on property lines to take care of traffic in case it is necessary to widen road beds.

## Invents Dirigible Headlight

OAKLAND, CAL., Sept. 19.—Victor A. Hancock, of this city, has invented and patented a dirigible headlight for automotive vehicles, which works automatically, lights only when the vehicle is turned, and operates from the steering wheel on an arc. It is intended to fill the need for greater lighting power in turning corners at night.

## Aim to Cut Cost of Assembled Trucks

### Important Price Revisions to Take Effect Immediately—Back to 1917 Level

DETROIT, Sept. 20.—Important price revisions by some of the leading unit parts makers, announced to the industry in the past week and effective almost immediately, are expected to place the assembled car and truck business upon the firmest price foundation that it has known since 1917.

In the opinion of the unit makers, their concessions will be followed at once by reductions in the prices of assembled cars and trucks, and the prices so announced will be stabilized for a long time to come. Car and truck makers whose present prices have anticipated the new concessions, will show a smaller reduction than in the case of products which have awaited definite action by the parts makers, but it is regarded as certain that there will be general revisions all along the line.

In announcing the price revisions to the trade, the parts makers are doing so with the knowledge that comparison with the basis of prices in 1917 will show not only that they have again reached that level, but in many instances are actually below them. In return, the revision of prices by the assemblers is expected to show the buying public a similar favorable comparison and restore buying confidence.

In fixing their new price schedules, the parts makers have based them entirely upon present day material and labor prices, and a production cost determined as accurately as possible on business which the reductions should bring about. The new prices will mean further heavy inventory losses, but these will be taken as necessary to restore confidence to the buying public.

## Fresh Fish Hauled 99 Miles

PORTLAND, ORE., Sept. 16.—An innovation in the use of motor trucks for long distance hauling was introduced in Oregon this week, when a load of 7400 lb. of fresh fish was hauled down the Columbia River from a fishing grounds near Mosier, Ore., 99 miles into Portland to be marketed. The load was the first of the kind ever brought such a distance by truck. The fish, the famous Columbia River Chinook salmon, were caught in seining grounds early last Tuesday morning by commercial fishermen at Mosier and the flopping fish were rapidly transferred from a barge to the waiting truck, iced for the purpose. By noon the fish had been delivered to a large retail fish market in Portland, ready for sale. They were found to be in perfect condition. The route over which the fish were taken is the famous Columbia River Highway, which is now paved the entire distance of 99 miles from Portland eastward to Mosier.



## Shippers Protective League Formed

### Armed Guards to Be Supplied Trucks Running Between Cities

NEW YORK CITY, Sept. 22.—In order to insure against theft of goods carried by trucks in inter-city haulage, a prominent firm of underwriters in this city, Farjeon Ballin & Co., has taken steps to safeguard the load so carried.

This firm has organized an association called the Shippers Protective League, which supplies armed guards for trucks running between cities. The insurance company has also inserted a clause in its theft insurance policy stipulating that the trucks on which goods are insured shall travel in a convoy and shall be accompanied by the armed guards.

Finally, through various merchants' associations, this company is endeavoring to enlist the co-operation of the State constabularies in patrolling the roads where thefts have occurred and where thefts may be expected, such as the direct roads between New York and Philadelphia and between New York and Boston.

This move is a direct result of the tremendous losses suffered by insurance companies in recent months through the theft of goods so carried. In one week two different trucks were held up by armed bandits and their cargoes, valued at \$40,000 in each case, were stolen. Many insurance companies, when the risk involved in such policies became apparent, either charged prohibitive premiums or refused to include the theft and pilferage item in writing insurance on truck cargoes.

## 200 Indiana Trucks Not Licensed

INDIANAPOLIS, IND., Sept. 16.—Following a ruling in court here recently in which the Indiana motor vehicle law was held constitutional, the prosecutor of Marion County is demanding that 200 defendants failing to obtain State license for trucks be adjudged guilty. He says that about 200 truck owners who did not take out state truck licenses were awaiting the outcome of the recent decision. Wm. P. Frye, the defendant in the test case, is the proprietor of the Wm. P. Frye Transfer Co., and at the time he was ruled against he was given 30 days in which to file an appeal. Several days in which to perfect an appeal have passed but it has not been filed. The county prosecutor is demanding action on the 200 other defendants.

## Fellowships in Highway Engineering and Transport

ANN ARBOR, MICH., Sept. 21.—The following Fellowships will be awarded by the Board of Regents of the University of Michigan not later than Nov. 1, 1921.

The Roy D. Chapin Fellowship in

## LIVE ASSOCIATION IN INDIANA

### From a letter to members:

Come to the big meeting next Monday night. The dump truckers will be initiated into the inner circle as a division, they will elect officers, adopt a constitution and start business as a division next Monday night.

Come to this meeting and help to extend a real welcome to them. Some new developments on the state tax question, you need to know what they are, to be on the sunny side of things.

### OTHER POINTS OF INTEREST

The Mirror Law, Registration of Ownership.

Two New Street Ordinances, Some Live Committee Reports.

Additional Facts about Red Ball Transit Co.

Are you cashing in on a slowly but surely increasing volume of business.

This meeting will be worth real money to all operators, will you get yours?

Monday Night, September 19th, Chamber of Commerce, 8 P.M.

DAN MORAN, President.

TOM SNYDER, Secretary.

Highway Transport, which is offered to provide for the investigation of an approved subject relative to Highway Transport.

The Roy D. Chapin Fellowship in Highway Engineering, which is offered to provide for the investigation of an approved subject relative to hard surfaced roads and pavements.

Two Detroit Edison Fellowships in Highway Engineering, which are offered to provide for the investigation of approved subjects relative to moderate cost country roads.

General Conditions: Each Fellowship pays the sum of \$250 with an allowance of \$50 for expenses. The holders of these Fellowships do not have to pay tuition fees. A Fellow must hold a Bachelor's Degree from a college of recognized standing. He must enroll as a graduate student in highway engineering or highway transport and as a candidate for the degree of Master of Science or Master of Science in Engineering. He must be in residence for one of the following periods: First Semester (October to February); Winter Period (December to March); Second Semester (February to June). An application for a Fellowship must include a concise statement of the candidate's educational training and engineering experience, and three references. Applications and requests for information pertaining to the twenty-five advanced courses in highway engineering and highway transport offered by the Graduate School should be sent to Arthur H. Blanchard, University of Michigan, Ann Arbor, Michigan.

## Coming Events

1921

October 12-14—Chicago, Annual Convention of the National Implement and Vehicle Assn. H. J. Samiet, Sec'y., 72 West Adams St.

Oct. 24-29, Oakland, Cal., Annual Convention International Traffic Officers' Assn., Municipal Auditorium.

## Trucks Boom Farms in California

### Large Increase in Number of Farms in Past 10 Years Due to Advent of Trucks

SAN FRANCISCO, CAL., Sept. 19.—The increase of 29,473 farms in California in the past 10 years—more than double the increase for the decade from 1900 to 1910—is due in large part to the advent of the motor truck and the great increase in its mobility and the varied uses to which it has been developed, in the opinion of dealers in automotive vehicles in San Francisco.

S. S. Nerney, manager for the W. L. Hughson Co., Federal truck distributors, and a veteran truck merchandiser on the Pacific Coast, gave some interesting figures on this subject. He said:

"In a recent report by Frank C. Jordan, secretary of state for California, it was shown that there were 872 farms in California in 1850. In 1910, 60 years later, this number had increased to 88,177, while in 1920 the big total of 117,670 farms had been reached. This means that the increase in the past 10 years, according to detailed figures by Mr. Jordan, has been 29,473 farms, nearly twice what it was from 1900 to 1910.

"California farm lands thus have seen wonderful development in the past 10 years, and there are several reasons to explain this advancement. The perfection of irrigation methods has done a great deal to reclaim arid soil, and new methods of agriculture, including that time and labor-saver, the tractor, have played their part, but in my opinion one of the most vital and influential forces in the development of these thousands of farms has been the automotive vehicle, and especially the motor truck, coupled with the good-road construction and maintenance these vehicles have compelled.

"Inaccessible farms have been brought up to a profitable condition by the use of the automobile and the motor truck, and the State's highways have been so improved, due to the demands of users of these vehicles that travel along them is now rapid, sure and safe."

## Electric Trucks to Feature Show

NEW YORK CITY, Sept. 19.—Displays of electric trucks will feature the electrical show which will be held at the 71st Regiment Armory beginning Sept. 28. Figures compiled by the managers of the exposition show that nearly 800 electrically driven trucks have been sold in the boroughs of Manhattan and Bronx in the last three years. The total in operation in the two boroughs at the beginning of the year was 3,142 and there were 4,362 in the Metropolitan district which had been in operation for a year or more. Wholesale and retail bakers lead in the number of trucks operated with 485.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. O. Building  
239 West 39th Street, New York

## CONTENTS

Vol. XXV, No. 6

October 15, 1921

### LEADING ARTICLES

The Land Convoy.....	7
What They Think of Motor Buses.....	12

### MISCELLANEOUS ARTICLES

Electric Truck Has Distinct Field.....	10
An Eye on the Game.....	11
Facts at Last.....	14
How Accurate Costs Won the Bid.....	18

### DEPARTMENTS

Your Midwest Truck Engine, Part 2.....	16
The Better Way.....	20
Buyer's Department:	
Trucks Disassembled When Shipped.....	24
Detroit Trailer Has Four Rear Wheels.....	25
Bell Resumes Production on 1-Tonner.....	25
Truck Accessories.....	26
Shop Equipment for Fleet Owners.....	28
Getting the Men to the Plant.....	30
Motor Truck Electric System Wiring Diagrams.....	31
The Fleet Owners' Forum.....	32
Editorial: Trucks and the Railroads.....	34

### NEWS

Urge Better Packing of Shipments.....	35
London Buses Carry Billion Passengers.....	35
Buses Bonded Heavily in Portland.....	36
Poor Trolley Service Favors Bus.....	36
S. A. E. Complete Tire Size Report.....	37
Trucks Save Largest Peach Crop.....	37
Urges Uniform Laws to Aid Traffic.....	38
Black & Decker Time Payment Plan.....	38

Index to Advertisers.....62-63

## The Commercial Vehicle

Charles W. Blackman, General Manager  
EDITORIAL DEPARTMENT

David Beecroft, Directing Editor  
Sinclair Gluck, Managing Editor  
F. Eugene Spooner, Technical Editor

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

Chicago, Mallers Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account .....	.50c
of Zone Postage Law .....	
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

## THE ZENITH CARBURETOR

*Has Been Used As  
Standard Equipment*

*for 7 years*

by **ATTERBURY  
ARMLEDER  
STEWART  
NETCO  
HALL**

*for 6 years*

by **FEDERAL  
DAY ELDER  
COMMERCE  
VIM  
WITT WILL  
FORSCHLER**

*for 5 years*

by **CLYDESDALE  
KELLY-SPRINGFIELD  
FAGEOL  
ROWE**

and by over fifty others for 1, 2, 3 and 4 years, BECAUSE—

It does its work well.

It gives power with economy.

It is simple in construction.

It cannot be jarred out of adjustment.

The truck-master can take control of the adjustment out of the drivers' hands.

*You can put ZENITH equipment on any truck. Write us or call our local branch or service station for details.*

**The Zenith Carburetor Co.**  
New York      Detroit      Chicago

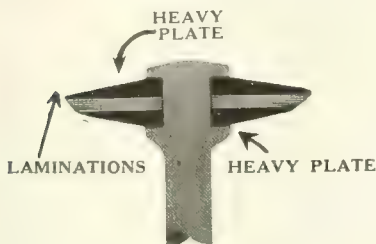


# Flexedge Valves

*Never Need Grinding  
and Always Hold Compression*

## NOTE

This is the fifth of a series of articles explaining the construction and operation of Flexedge Valves. The next article will be in Commercial Vehicle Nov. 15. Look for it.



## Valve Trouble Is Serious—It Should Always Have Immediate Attention.

Practically all valve trouble can be traced to carbon. Misalignment, warping and compression leakage are all the results of carbon formation on the valve seats and the valve heads. Removing the carbon by grinding helps for the time being but is not a permanent cure.

Flexedge Valves solve this problem. They prevent the formation of carbon. Instead of being one solid piece, the head is made of laminations. When the head strikes the seat on the closing stroke the edges of the laminations are flexed slightly (about .001"). This flexing action removes carbon as fast as it forms. The seat is kept bright and clean. Compression leakage is stopped because the valve seats perfectly on every closing stroke. Fuel consumption is reduced. Power is increased.

Flexedge Valves are made for all truck motors, regular sizes and oversizes. Write for literature and complete information.

## Flexedge VALVE TOOLS

A complete line of cutter heads, pilots and reamers in all sizes—standard, standard oversizes and special. The design of the cutter heads eliminates possibility of chatter. Sold individually or in sets. Fully guaranteed. Write for literature and prices.



## SELF SEATING VALVE COMPANY

340 W. Huron Street  
CHICAGO



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Vol. XXV Oct. 15, 1921 No. 6

## THE LAND CONVOY

### *Guards Valuable Truck Cargoes en Route in Intercity Haulage*

**HIGHWAY** brigandage has developed a phase of intercity commercial transportation almost as picturesque as the armed stage-coach of the old Wild Western days—namely, certified motor truck service from door to door under the protection of armed guards. Because of the persistent holding up of merchandise-laden trucks going singly and in pairs, the favored procedure now is to send the vehicles in caravans of from ten to a dozen units, with armed men on each and the entire caravan followed by a small, fast-going truck as a convoy with armed guards and reserve ammunition and weapons.

It seems almost incredible that this new type of transportation should have its origin in the largest eastern cities, but such is the case. Hundreds of thousands, if not millions of dollars' worth of merchandise—for the details of not all the road robberies have been made public—has been taken from trucks in transit between Philadelphia and New York in the last year and a half and at least four drivers are known to have been murdered by bandits in the same territory since last Christmas.

It is on record that nine men held up two trucks near Metuchen, N. J., not long ago, bound and gagged the drivers in the woods and escaped with \$50,000 worth of goods. It is reported that within the last eight months not less than \$500,000 worth of silks and other textiles has been taken, violently or oth-

erwise, from commercial cars in transit between Philadelphia and New York. Plundering trucks containing textiles appears to have been the backbone of

veyance—which would guarantee reasonable safety of the goods. Whereupon, enter the caravan and armed convoy as the answer!

An example of this new idea in guaranteeing safe passage of goods from city to city under armed escort, is that of "Philadelphia-New York Limited, Inc.," a consolidation of several motor transportation companies, whose headquarters is at Front and Richmond streets, Philadelphia, and which has a station at 161-165 Perry Street, New York City. This certified truck service, which was inaugurated on Aug. 15 last, makes overnight deliveries between Philadelphia and New York, from door to door, under the protection of armed guards.

Shippers are given insurance receipts covering loss through robbery, theft, pilferage, fire, flood, upset and collision, the carrier being liable for an amount not in excess of the declared value of the goods and in no event in excess of \$20,000 in respect to any one load, nor of \$60,000 with respect to several loads in any one place or at any one time. A powerful armed convoy protects the trucks en route and there are uniformed guards—most of them cited for valor in the recent war—on city delivery trucks.

There are 25 trucks in the road fleet, the units consisting of van, rack and stake bodies, divided as follows: Ten Packards of 5-ton capacity each; five Macks of the same capacity, and ten Pierce-Arrows, also 5-tonners. "Certified" truck service signifies examination by the underwriters' inspection and adjustment bureau before the policy is issued, this policy covering the ship-

### *Inaugurating Certified Truck Service*

Overnight deliveries between Philadelphia and New York—from door to door under the protection of—

### ARMED GUARDS

**SHIPPERS** are given Insurance Receipts covering loss through pilferage, theft, robbery, fire, flood, collision, etc. A powerful Armed Convoy protects Trucks en route—Uniformed Guards on City Delivery Trucks. A Fleet of 25 Certified Trucks is at your service.

**Philadelphia-New York, Limited**

(Incorporated)

Alfred G. Hare, President

**PHILADELPHIA**

Front and Richmond Sts.  
Tel. Kensington 5516-0321

**NEW YORK CITY**

161-5 Perry St.  
Tel. Watkins 7347

the bandit "industry," but looting has not been confined to any single type of merchandise.

Because of this epidemic of robberies entailing heavy losses of merchandise, shippers began to clamor for some form of transportation by truck—the most convenient and economical mode of con-



# Armed Guards for Valuable Truck Loads

per from the moment of signing at his door till delivery has been made and the receipt signed against all losses, by the consignee.

The concern also maintains ten "pick-up" trucks in each terminal city, these vehicles, varying from 2-ton capacity to those capable of carrying 3½-ton loads and upwards, collect and deliver less than the big truckload lots. Because of this double fleet the concern rarely has to hire any vehicles. All the trucks are heavily padded for protection and are doubly lined.

The merchandise carried consists largely of textiles, raw wool, machinery, steel and iron plates, parts for ships, miscellaneous goods and packages. Structural steel units up to forty feet long have been easily carried and, in fact, "anything from a nail to a boat" is taken for transportation.

## Three Men on Each Truck

Each truck has aboard it in transit a driver armed with a revolver; a helper, similarly armed, and an armed guard. Three men are dispatched with each truckload of goods, because sometimes it is necessary for both driver and helper to be busy simultaneously, when the third man can keep a sharp lookout. A very early human principle was that "two men can work in collusion, but rarely three, without a falling out." Hence, the usual "committee of three." The guards employed on city deliveries wear a well-fitting khaki uniform, with brass buttons, visored cap and badge, giving them a "snappy," police-like appearance. All are experienced and tried men, a number of them having served in the

World War. The commander of the truck guards for nineteen years was a detective on the New York police force and later general superintendent of the Baltimore & Ohio railway detectives.

## Under Military Discipline

The guards report to their immediate chief and he in turn reports to an official of the trucking service. The larger and more handsome trucks with van body and patent locking rear doors are cream color with huge black lettering shaded with red. All are numbered and the vans have as the top line on the sides the announcement, "Certified, Bonded and Licensed Carriers." They make an especially effective advertisement.

Below the announcement mentioned, on each side also appears the name, "Philadelphia-New York Limited, Inc.," with address and telephone number of both the Philadelphia and the New York station. In front, above the cab, are the truck number and the word "Limited."

The caravan usually consists of ten trucks—although there may be as many as twelve—running at a distance of approximately 50 ft. apart in single file on the road, with a convoy bringing up the rear. This vehicle, a Dodge light commercial truck with top, carries the "convoy master" and his assistant, each armed with a rifle and a revolver. In the body of this car are reserve weapons and ammunition. It falls upon these two guards to keep a lively watch over the train, or caravan and to see that no attack is made from sides or rear. The guards, including those with the drivers and helpers, have a code of signals

whereby news of anything suspicious, or dangerous noted en route, is quickly communicated down or up the entire line of trucks, so that no unit of the caravan need be caught unawares.

The convoy is changed at Kingston, N. J., going and coming, and an entirely new set of guards for the commodity trucks, with new driving and helping crews, is taken on at the New York station, for the return trip to Philadelphia, which has obvious advantages. All runs between the two cities are made at night, which permits the receiving and loading of merchandise during the day time, as well as deliveries to places of business.

## Equipped with Governors

The road trucks are equipped with governors, set to run at twelve miles an hour and all have equal speeds.

The garage and headquarters in Philadelphia is in a single-story brick building whose dimensions are 100 ft. square. At the left, as one enters the set of double sliding doors on that side, is a huge platform that does double duty for loading and receiving. This platform takes up the greater portion of that side of the building.

Between the platform and the front entrance mentioned, is a small office, which includes that of the dispatcher. Across the building, in a corresponding position, are the executive offices, while immediately in their rear are oil and parts reserve supplies. Gasoline, purchased in large quantities, is stored in tanks according to law. While there are benches and small tools for making minor repairs and adjustments here, the concern maintains a repair shop, service station and paint shop on another street. There is no rear or side exit to the main station, which lessens the strain of close observation of all trucks and persons leaving and entering the building; but there are two front entrances. An office force of fifteen sees to the routine.

## All Employees Are Bonded

There is such machinery as chain hoists and portable cranes for lifting heavy loads at the platforms, which is truck-floor height, and broad as well as long. All stocks, including oil, gasoline and parts, are under locks and are issued only on requisition, being checked up carefully on the forms.

Every employee is bonded, from the drivers' helpers to the president, Alfred G. Hare of Philadelphia. The other officers are: Hugo Waldvogel, vice-president; Herman Snyder, treasurer; Charles F. Frizzelli, secretary, and Edmund J. Coxey, assistant treasurer and general manager. Mr. Snyder is manager of the Philadelphia office assisted by C. V. Clair. Mr. Waldvogel, assisted by John



*This is the type of large truck used by Philadelphia-New York, Limited, Inc. The uniformed armed guard is typical of the well set up, experienced men chosen to protect from bandits the valuable cargoes in transit between the two cities in question*



Ash, manages the New York branch. The concern claims to be the largest motor trucking company in the East operating under one head.

### Keep Twelve-Hour Schedule

The men work on a 12-hr. schedule. About 7:30 a.m. the trucks from New York begin to arrive and by 8 are backed up at headquarters platform. All trucks must be out of the station no later than 9:30 to start making deliveries, which usually have been accomplished by 1 p.m., when the trucks return to the garage and the men take thirty minutes off for lunch. After the meal, the drivers pick up orders for the separate territorial sections into which the goods on the platform are divided, the drivers being thoroughly familiar with the city and with the methods of routing. Platform men, however, superintend the placing of the merchandise for the different drivers, as a check against error. Each truck is inspected at both ends of the route when it comes in and before it leaves, to be certain that each vehicle is in first rate condition for the trip. A special man is detailed at each terminal for this job.

There are two freight checkers and examiners at the Philadelphia end and three in New York. Ten men usually work at loading on the platform, and it takes thirty minutes, on an average, to load one of the five-ton trucks. Plenty of rollers and crowbars are supplied to the men for moving goods about.

### How Goods Are Sorted

The goods are sorted out on the platform for certain divisions of delivery. Philadelphia deliveries will be designated, for instance, as follows: Central delivery—Girard Avenue to Pine Street; downtown delivery, from Pine Street to League Island; from Market Street east of the Schuylkill River; lower Kensington, upper Kensington and Frankford; intermediate delivery, from Broad Street, west. Goods come in considerable quantities from New England to New York; are picked up in New York and taken on to Philadelphia by the company's trucks. Sometimes in Philadelphia, for instance, there may be a plethora of merchandise for Kensington and only enough business for another division to keep one truck busy; in such case, three or four trucks might be assigned to the Kensington division. The checkers check each load and integral parts thereof in the morning and during the day while the loading is in progress.

All the drivers who have been making pick-ups in Philadelphia are ready to start out picking up merchandise consigned to New York by 1:30 again and return by 5:30 or 6 p. m. At the latter hour they back up to the platform and the checker tallies off the freight to see it corresponds with what is on the shipper's slip, as it must do, item for item. Reloading into the big trucks is begun and the trucks are ready to start for New York.

The same care is taken of miscella-

neous loads as of "straight" loads and the smaller, pick-up trucks carry their armed guard, driver and helper, the same as in the case of inter-city deliveries. There are plenty of canvas and tarpaulin covers for goods in wet weather, in addition to the covered vans, padded and double-lined.

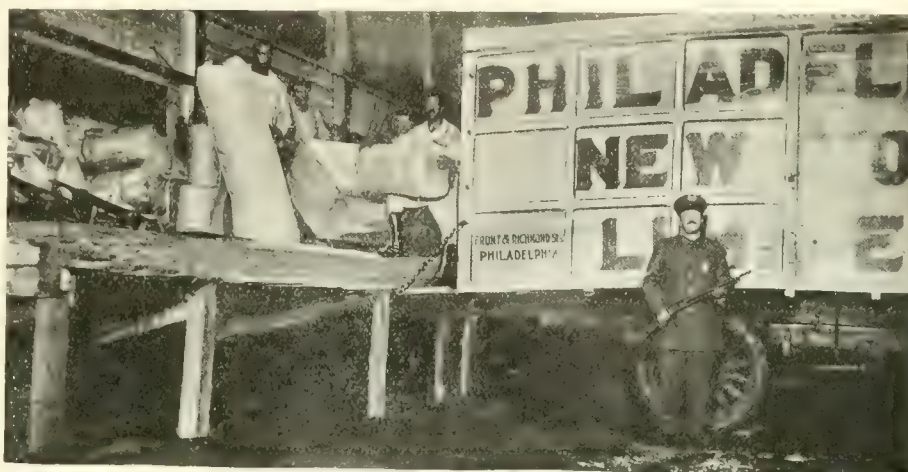
Routings for New York and vicinity are in general divisions as follows: Up-

New York station in Perry Street. Return is made over the same route.

The form of uniform non-negotiable receipt used between carrier and shipper in this business is made out in quintuplicate. It is 7 x 8 in., with all the copies bearing the same serial number.

Each copy also bears the well known "Ship by Truck" symbol.

No. 1 form, a white one, the shipper's



*The upper view shows one of the big trucks loading at the large loading platform of the concern in Philadelphia. The truck is already under guard. The lower view shows an armed convoy ready to start. The convoy car carries two men, each armed with a rifle and a revolver*

town New York; downtown New York; Brooklyn; northern New Jersey; Jersey City; Newark; Paterson; Passaic; Bayonne; Bound Brook; Irvington, N. J.; Hackensack and Hoboken.

This is the present route of the trucks from Philadelphia to New York, part of which is subject to change after certain repairs have been finished on the Lincoln Highway: Through Frankford and Cornwells, using the State highway; through Leipsville into Morrisville, Pa., crossing the bridge into Trenton, N. J., and striking the Lincoln Highway, through Lawrenceville, Princeton, Kingston—where the convoy is changed—New Brunswick, Metuchen, Rahway, Elizabeth, Newark, Kearny, Jersey City to the Montgomery Street wharf, crossing over to Desbrosses Street in New York City and proceeding to the company's

receipt, is retained by him. The shipper also receives Form No. 2, likewise a white one, which he mails to the insurance company. This is known as the insurance receipt. No. 3, a blue copy, is the delivery receipt for which the consignee signs, acknowledging that he received the merchandise. No. 4, a pink copy, is the freight bill, which is sent to the party who pays the charges on the freight. No. 5, a yellow copy, is the cashier's voucher, to be retained in the general offices of the transportation company for a permanent record against the shipment.

It is to be hoped that the armed convoy will prove a temporary measure, required only for troubled times. But it is interesting, as showing not only the value of merchandise carried by trucks but also the reliability of the service.



# Electric Truck Has Distinct Field

*Some Interesting Exhibits at the New York Electrical Show. New Walter Electric Shown*

THE electric truck in short haul work is becoming more popular as each day goes by in the fleet owner field. In house to house deliveries a large number of concerns have been converted to this type of vehicle because of economy in operation as well as ease of maintenance. In congested districts, especially, the electric truck lends itself to economical operation because of its extreme flexibility of power control which enables an operator to adapt its speed to all conditions of traffic.

It is reported that one large department store in Philadelphia has decided to standardize entirely on electric trucks in the delivery of parcels. Other companies are also reported as considering taking the same step. That the popularity of the electric truck is fast gaining was manifested at the recent electric truck show held in New York City from Sept. 28 to Oct. 8. Both the truck and battery exhibits proved of interest to many visitors.

The fact that no radical changes in design have been made for some time by electric vehicle engineers indicates that that vehicle has reached a stage of final development. Exceptional operating characteristics in the way of vehicle speed and low current consumption seemed to be the biggest merchandising points brought out at the truck show.

Those looking for newcomers in the electric truck field were greeted by the Walter, made by the Walter Motor Truck Co., New York City. The company exhibited a 2-ton model with the patented automatic locking differential and suspended drive, well known to the users of the Walter gasoline vehicle. Interchangeability of parts when using both electrics and gasoline trucks is now possible with Walter trucks, except their respective motor parts.

The Lansden Co. exhibited a 1500-lb. vehicle which was shown to the public for the first time. This is of an improved double reduction design and is

regularly equipped with pneumatic tires.

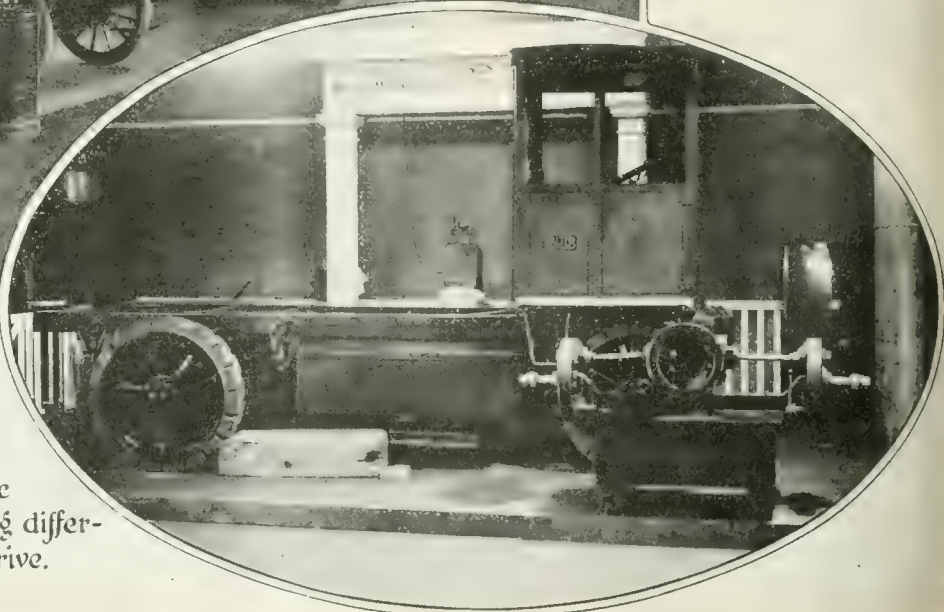
A new  $\frac{3}{4}$ -ton truck made for the John Wanamaker Co. department store was on exhibition at the booth of the Commercial Truck Co. In addition, the exhibit showed the entire motive mechanism of a C-T electric 1-ton truck.

Other trucks on exhibition included those made by the Walker Vehicle Co. and the Ward Motor Vehicle Co.

A majority of the representative electric truck battery makers exhibited their products. These included Edison, Exide, Titan and K. W. The latter battery is made by the K. W. Battery Co., Chicago. It is a pioneer in the battery field but has only within the past 9 months been brought to the attention of eastern fleet owners. This company is featuring the manner in which it gives continuous battery service to truck users at a minimum and fixed cost. The business of this company consists entirely of furnishing batteries and battery service to electric vehicles.



The C. J. Walker, Ward and Lansden electric truck exhibits at the Electrical Show.



The new Walter 2-ton electric chassis with the automatic locking differential and suspended drive.



# An Eye on The Game

By

Sinclair Gluck



SILAS GUNTHER, president of the town's most flourishing commercial house, leaned back in his comfortable office chair and smiled to himself. No one, not even the closest of his able lieutenants, knew of all the plans for the betterment of the business and of his employees which had had their origin in that chair and at that desk. But there was another branch of the old man's activities which all his workers knew about and which had won him the nick-name of Old Hammerhead, an affectionate title of which he was secretly proud.

It was in connection with this branch of his work that the old man was smiling this morning. He had made it a custom to hold little talks with the men under him, eliminating, so far as possible, all formality and getting each man to speak his thoughts as they came. It was a safety valve through which the employees could blow off high-pressure grudges or wrongs under which they might feel themselves to be suffering and at the same time it gave the head of the firm an opportunity to interest himself in the individual future of every man in his employ and to help them to build up their own individual careers and to build a bigger and better business for all, at the same time.

There was a knock on his office door and in answer to his summons a thin-faced, sallow young fellow with a very pointed nose sidled into the room and nervously approached the arbiter of his destinies. He had never had a talk with Old Hammerhead before. He knew that he had been caught red-handed in something for which he would have been instantly discharged in many business houses. And he did his best to brace himself for the coming storm.

That is why the old man's greeting brought him, limp and bewildered, to a chair facing his employer.

"Hello, Hines," said the old man, jovially, "Glad to see you. Make yourself comfortable there, in that chair, and

we'll have a talk. I haven't had a chance to get acquainted with you until today, I'm sorry to say."

For one moment, Hines was conscious of a flash of relief. Perhaps the old man did not know what he had been doing after all. Then the hope faded, as his naturally suspicious nature reasserted itself, and he braced himself anew. This, he told himself, was only the lull before the storm. The old man would try to lull him to a sense of security and then jump on him all the harder.

But Old Hammerhead never jumped at all. Instead, he leaned back in his chair and smilingly looked the young fellow over for a moment.

"Hines," he began, without preamble, "I understand that Ross turned over to you the books in connection with keeping costs on the trucks. Is that right?"

"Yes sir," the young fellow answered.

The old man nodded. "How do you like the work?" he asked, "Is it going pretty smoothly?"

"Yes, I think so."

"That's good."—Old Hammerhead hesitated for a moment. "Now," he went on, "I understand that you have been doing some outside work for another concern, in connection with your book-keeping work. Is that right, Hines?"

Hines drew a long breath. Then he looked at the kindly, smiling face opposite him and took courage. "Yes, sir, I have. But I've never done it until my work here was entirely cleaned up, of course."

"Well, Hines, I think that you are making a mistake. That's why I wanted to have a talk with you. I think I can show you why you are making a mistake."

The old man settled himself in his chair. "Hines," he began, "You are working here with two objects in view and the two are very closely connected. One of these is to make an immediate living. The other is to build the foundation for a success in life. Am I right?"

"Yes, sir."

"Good—Now," the old man went on,

"The question is whether you want to make a little more money immediately or a great deal more money later on. I think you want to make a great deal more money and hold a really worth while position later on. Am I right?"

"Yes, sir."

"Well, Hines, I don't believe you are keeping your main object in view. You want to make good with us, if you are to stay with us, and it is going to take you all your time with us, really to make good and make good quickly. You can't do that if you are working for someone else in your spare time here. For it is your spare time here in which you can build up your future by thinking for the business."

"Now, Hines, I want you to keep your eye on the game you are gunning for. I remember when I was a young fellow up in the Adirondacks, I was crazy to get a moose. I hunted and hunted and then one day I got a good shot at 1000 yards. I wounded the beggar and then, as I started to run forward, I spotted another moose off to the right and about 500 yards away. So I lay down and waited for a good shot at the second one, forgetting all about the first one. Well, Hines, I don't know whether the first one winded me at once, or came in my direction and winded me later. But I heard a twig snap and looked up and here was the first one about 30 yards away and coming for me like an express train. He looked as big as a house, too."

"Well, Hines, I got him—more by luck than good management. He was almost on top of me before he fell and I was so scared and excited that I could hardly walk to where he lay. But it taught me a lesson. It taught me to keep my eye on the game I was after until I got it and ignore everything else."

"It seems to me that you're very much in the same position, Hines. You want to make sure of this moose, before you go gunning for anything else. Don't you think so?"

Hines got to his feet, a look of grateful relief in his eye. "Yes, I do—and thank you, sir."



# What They Think of Motor Buses!

*Recent Electric Railway Convention Shows That Majority of Street Car Men Regard Bus as Menace to Be Eliminated. Small Minority Favor Buses as Feeders for Street Cars*

THE fortieth annual convention of the American Electric Railway Assn., at Atlantic City October 3 to 6, has come and gone. And any interest at the convention in a comprehensive solution of the problem of motor bus competition was conspicuous by its absence.

Allusions to bus competition in many of the speeches showed clearly that members consider it a danger rather than a possible ally. But no attempt was made to face the issue directly.

There were two elements present. One side, the more conservative, was greatly in the majority. These men seemed to regard the bus as a menace to their business and nothing more.

The other and more progressive side, consisting of only a few men some of whom have already installed buses to co-operate with their trolleys, regarded the bus not only as a possible but as an actual ally. But these men made no headway against the weight of opinion ranked against them.

Taking the convention as a whole, the motor bus may be said to have been almost entirely disregarded as a factor in street car line transportation.

If it were possible to get a birdseye view of any extensive modern movement or improvement, from its inception to its final stage, the slow and ponderous nature of the development—the innumerable bypaths and costly blunders which accompanied this development—would be strikingly apparent. Single individuals or even small groups of men have dreamed a dream and seen a vision that has taken them almost directly to the final goal. But give the movement a broader scope and the wastage of time and misdirected effort often becomes appalling.

## Passenger Transportation

Passenger transportation in the United States has been no exception, principally because, aside from the steam railroad, the development of passenger transportation has been in the hands of many individuals, working locally, and with little idea of what the other fellow is doing or why he is doing it. Few have been able to profit by the blunders of others and still fewer to

take advantage of the successes of others.

There are organized and influential groups of men in the passenger transportation business, aside from the steam railroads. There are the electric railway interests and there are the manufacturers of buses and of truck chassis convertible into buses. But it is necessary for both of these important groups to work in a fundamentally constructive way to solve the short haul passenger transportation problem.

There was little effort along this line at the annual convention of the American Electric Railway Association. Men in the transportation business—men of vision who saw beyond the immediate sale of their commodity, to a market better, broader and more satisfactory to all concerned—may have held great hopes in this convention. But their hopes were justified to a very limited extent.

## Present State of Flux

Passenger transportation in short haul work in the United States is in a chaotic state of flux at the present time. Here and there, in cities such as New York, Washington, and Toledo, well organized, efficiently operated motor bus lines are working in conjunction with street car lines to a greater profit of both and the general satisfaction of the public. Here and there in other cities more or less well organized bus lines are competing with street cars at a profit to themselves and a heavy loss to the electric lines. Here and there jitneys operated on a shoe string are cutting down the number of street car patrons at little profit to themselves. Elsewhere buses have tried to compete and have failed. The difference in the outcome has depended upon local conditions and the efficiency with which each type of transportation was organized and operated.

There can be no doubt in the mind of the intelligent observer that there is a field for short haul bus transportation. And there should be no doubt in his mind that the bus is to be reckoned with in that field.

At the convention, the electric railway interests apparently regarded the bus as a powerful and threatening factor. Speech after speech contained, for the reader between the lines, almost breathless reference to motor competition.

And the bus was regarded so far as most of the set speeches were concerned, as an opponent only—not a possible ally.

## King Canute Attitude

On the whole, the attitude of the speakers, somewhat resembled the King Canute point of view. The more conservative electric traction interests do not want the tide of bus competition to rise any higher. So it seemed to be generally conceded that the best thing to do was to order it back, by means of legislation and of a great publicity campaign, extolling the benefits of street car lines to municipalities and the general public, and decrying buses as undependable, incapable of handling the traffic and unwilling or unable to stand their share of municipal duties and municipal taxation.

One speaker stated that there was only one successful bus line in the United States, the Fifth Avenue Coach Co.

Another stated that no bus line stood its share of municipal expenses.

There are many successful bus lines in California and elsewhere. Bus lines pay taxes and in some cases have franchises. And the work of the Fifth Avenue Coach Co. in clearing the snow during the last two winters from the streets on which it operates was an excellent example to municipalities far and wide.

But far more important than any inaccuracy of statement was the mistaken attitude of the convention toward the entire problem. After all, it is the most economical form of transportation which should—and will—survive. The question, fundamentally, is not one of profit for traction companies now in business and in no hurry to go out of business, but one of solving the problem of the most economical and efficient form of transportation in each locality and under each set of conditions.

## Best Type Will Survive

Either the street car lines are of real and permanent value to the communities in which they operate, or they are not. If they are of permanent value they will survive and they have little to fear, except possibly financial mismanagement and inefficient operation. If they are not of real and permanent value in their particular communities, the director



and stockholders should read the writing on the wall and either get out of a bad business altogether or adopt the type of transportation which will solve the problem in their communities—for if they are not of real and permanent value, *they will not survive.*

Some of the electric railway interests have realized the importance of a clear understanding of bus transportation. A committee of fourteen had been previously appointed, under the chairmanship of H. B. Flowers, vice-president of the United Railways & Electric Co. of Baltimore, to inquire into the question of trackless transportation. Unfortunately, the committee had not sufficient time to prepare a comprehensive report.

At the general meeting on Wednesday, October 5, in the morning, Mr. Flowers, the committee chairman, announced that he had only a progress report to make. He asked that the committee be reappointed further to consider the question of trackless transportation. He stated as his view that the trackless trolley and the motor bus must be conceded a place in the sun and that more time has to be granted the committee to inquire further into this important subject.

### Committee Not Prepared

It has been stated that of the fourteen reports of sub-committees which should have been turned into the committee, only two were available in time for the convention. One of these, the report of the sub-committee representing motor bus manufacturers was turned in to the committee. No notice was taken of this report on the floor of the convention.

The two members of the committee, T. W. Fenn of the National Automobile Chamber of Commerce and D. C. Fenger of the International Motor Co., who represented this sub-committee, were present at this session with a recommendation which they had prepared dealing with the manufacturer's angle on trackless transportation, but were not called upon.

The report of the committee on publicity called attention to the failure of buses to handle the traffic in Des Moines when street car lines were discontinued. There were numerous leaflets available dealing with the Des Moines situation and attacking the bus generally.

### Motor Bus Competition

F. E. Frothingham of Coffin & Burr, Boston Mass., stated that the street car lines have been subjected to severe competition in the jitney and in bus lines. This was badly met. The street car lines ridiculed it instead of insisting on fair competition and trying to absorb this competition. This attitude resulted in hostility from the public. He stated that the Fifth Avenue Coach Co. was the only successful bus line in the United States and went on to say that possibly trackless trolleys might solve the problem of this competition for the street car line. But, he said, that if there must be competition, buses and jitneys must bear

their share of street maintenance in clearing snow just as the car lines do.

J. K. Newman, Isadore Newman & Sons, New Orleans, La., also spoke on the subject of street car line finance, municipal ownership, etc. He referred in passing to jitneys and buses. The gist of his remarks was as follows: Jitneys and buses take money from the street car lines. When this happens the street car lines have to raise their fares to meet expenses and the public suffers accordingly. If the street car lines are discontinued, he said, up will go the fares on the buses and down will go the service. It is not clear from the above why the public which takes the bus should suffer because the street car line raises its fare. And the question of increased fare and decreased service on the bus lines, once the street car lines are discontinued, is problematical.

Finally, he said, that if street car lines are discontinued the city will lose the franchise and the paving done by the street car lines. Jitneys and bus lines, he stated, should not be permitted in competition with trolley lines any more than two fire departments should be permitted. City franchises should guarantee no jitney or bus competition with street car lines.

Edwin Gruhl, vice-president and general manager of the North American Co., New York, in the course of his speech also touched on the subject of motor bus competition. He stated that "While the motor bus has the advantage of low investment and small overhead expense, and greater speed and flexibility of operation, the operating cost of a motor bus per seat mile is practically twice that of an electric car. It is not likely, therefore, to seriously menace the industry except during periods of unemployment." According to a prominent bus operator these figures are based on the 16-passenger bus and do not apply to buses of larger capacity.

### Progressive Element

These remarks are characteristic of most of the speeches in which jitneys and motor buses were mentioned. But it must not be understood that all members of the American Railway Association are inclined to disregard the real value and importance of motor bus transportation. H. B. Flowers, general manager of the United Railway & Electric Co. of Baltimore, and chairman of the committee on trackless transportation, is very much in favor of the use of buses by street car lines. His company was one of the first to use buses, operating first twelve and then fifteen. The company is now going in for larger buses and may possibly experiment with double deckers.

In the debate on Tuesday J. P. Barnes, President of the Louisville Railway, led the progressive element. He said that the electric railway should regard itself as the transportation purveyor of the community, and as such should use every means available to improve transportation. He stated that the automotive industry was composed of real live men

who knew the facts. In this connection he referred to the address last year in which Mr. Graham, coming from the automotive industry, held out open arms to the electric railways and offered to help them in any way possible. Mr. Barnes went on to say, "We took our heads out of the sand then but we've stuck them back in again now."

### The Position Stated

On the whole, the position seems to be this. Unorganized jitney buses have done much in many communities to damage the prestige and decrease the profits of street car lines. If this is the case properly organized and efficiently operated bus lines will surely do more damage. And these bus lines are coming. Therefore, where bus lines are practicable it would seem obvious that there are only two courses of procedure open for the street car lines in certain cases, either to organize and operate the inevitable bus lines or go out of business.

From the views held by the representatives of manufacturers present at the convention it would seem that there is a strong inclination on their part to recommend the use of present standard equipment for buses.

The attitude of the manufacturers is perfectly comprehensible. The exact specifications of the vehicle most suitable for city bus work have not yet been determined. It is not known what type of chassis will be demanded by the street railways which buy and operate buses nor is the extent of that demand known. To construct a chassis which will be ideal for city bus work will mean much research and designing effort and possibly the installation of additional machinery to manufacture the final design. It is natural that the manufacturers are reluctant to undertake this work without any knowledge of the extent of the market on which they can depend for the sale of the ideal vehicle when it is completed.

### Is Truck Chassis Suitable?

On the other hand there are some who hold that the truck chassis is not suitable for the best type of city bus transportation. They hold that the high center of gravity increases the danger of overturn; also that the height of the body on the truck chassis makes it inconvenient for the passengers to board and alight from the vehicle. And there are other doubtful features. As an example of this it is reported that a truck chassis of a prominent and reliable make was recently tested out in city bus work by a large bus company. The bus had already made a trans-continental trip but was in perfect condition and was driven by a representative of the manufacturers. At the end of a week the clutch, the brakes and other parts of the vehicle are reported to have failed under the constant strain of stopping and starting in traffic and the vehicle was practically useless.

But the bus is coming. The ideal type of bus chassis is coming also and will survive.



# Facts at Last

**Test Will Show Damage by Trucks  
and Best Road Construction**

**By Charles W. Geiger**

**A**T last we are to have definite facts on truck road wear.

Comprehensive, definite tests of the effect of motor trucks on different types of road beds are to be made or have already been made on a test highway recently completed at Pittsburg, California. The Motor Car Dealers' Association of San Francisco, the Columbia Steel Co., automobile clubs, city engineers, county engineers and others will cooperate in making the tests.

The argument has been used almost universally against trucks that they are the cause of excessive road wear. The argument is always used from the point of view that the country's highways belong, by right of priority, to passenger cars and that the trucks are interlopers. But trucks have come to stay. The highways belong as much to trucks, which supplement and increase certain functions of the nation's business, as to passenger cars, which supplement and increase others. If trucks do not cause excessive road wear, this test will show it and the argument will be answered once and for all. If trucks do cause excessive road wear, then the roads must be improved—must be built for trucks—and this test will show which types of roads will stand up under truck wear and must therefore be adopted.

In making the tests, complete checks will be made of results at all stages, so that, at the conclusion of the test, the results will be available in practical form and can be used to advantage in determining what types of construction are best adapted to California soil conditions.

## Tested with 40 Trucks

The tests will be made with forty motor trucks, twenty traveling in each direction around the test highway, which is built in the form of a race track.

The road will be subjected to a greater strain, considering the number and weight of the vehicles, than any highway in the state is subjected to, considering its regular traffic. From 3000 to 4000 motor trucks will pass over the road each day and the average weight of the trucks and loads will be about 8 tons.

Observations will be made of the results of this traffic and later, when some of the stronger sections fail to yield, War Department equipment will be used to complete the destruction. These will include heavy tractors, gun carriages and the new Government caterpillar tractor, which weighs 28-tons and has a speed of 25 miles per hour.

The conditions of the test are such and the participation of eminent engineers of such a nature that the results,

it is believed, will be of the utmost value to state and county road builders. Sections of the road that give way first will be repaired, so that the whole road will be usable until its last unit fails under the strain. This will afford valuable opportunity to observe results of various types of repair work, a matter of particular interest as so many of the state highways are now undergoing reconstruction.

## Results of Great Value

Many observations will be made on the test highway which were never attempted before. Four tunnels were built beneath the pavement for the purpose of taking observations on the underside of slabs, to find out, if possible, just what happens to the under side of the slab and the sub-grade. By means of these tunnels it will be possible to determine the effect of various truck loads and speeds on the flexure of the slab as well as on the sub-grade.

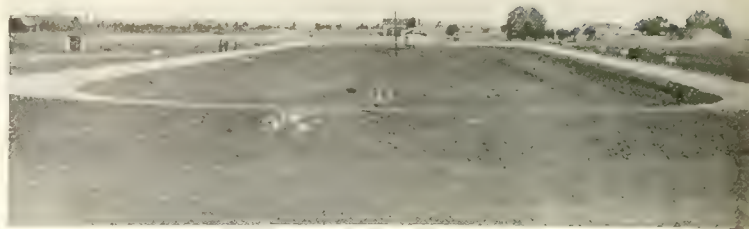
Self recording instruments are to be used in each tunnel which will indicate the flexure caused by the loads on the pavement. The reading sheets will be filed daily which will give a complete record of slab and sub-grade deflection throughout the entire test.

It is believed that these underslab tests will be of great service to all road builders as this is the first time that it has been possible to make observation from the under side of the pavement.

## Water Test Important

There are ditches on either side of the test highway, arranged so that water can be turned into them and raised to the height of the top of the sub-grade. Holes have been provided in the concrete pavement which have been stopped up with wooden plugs. These plugs will be removed and borings will be taken in the sub-grade when the latter is perfectly dry. The borings will then be replaced and tamped down and water turned into the ditches, after which borings will again be taken to determine the rate of percolation. From the observations taken in the tunnels the relationship between the moisture contents of the sub-grade and its bearing power under traffic will be learned.

An extensometer will also be used to measure these loads from the under side



*The test road is built in the shape of a race track. It is 1371 ft. in length, lit by a powerful flood light and built with ditches on either side which can be flooded with water*



*This is a section view of the test highway. The test road is subdivided into thirteen sections comprising thirteen different types of road construction, including both plain and reinforced concrete and varying from 5 to 8 in. in thickness in different sections*



of the reinforced slabs, the first time that this has ever been done. Readings will also be taken with instruments on top of all slabs.

## Sub-Division of Highway

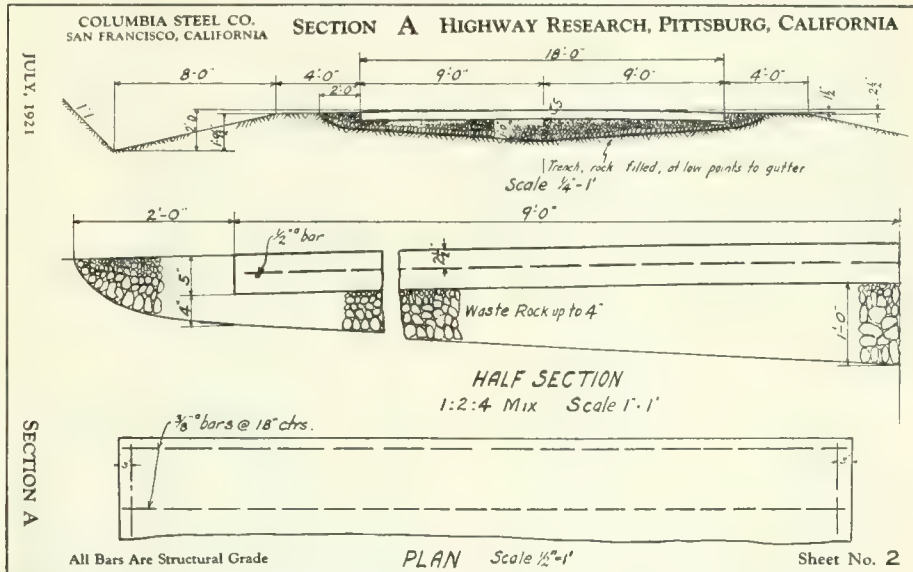
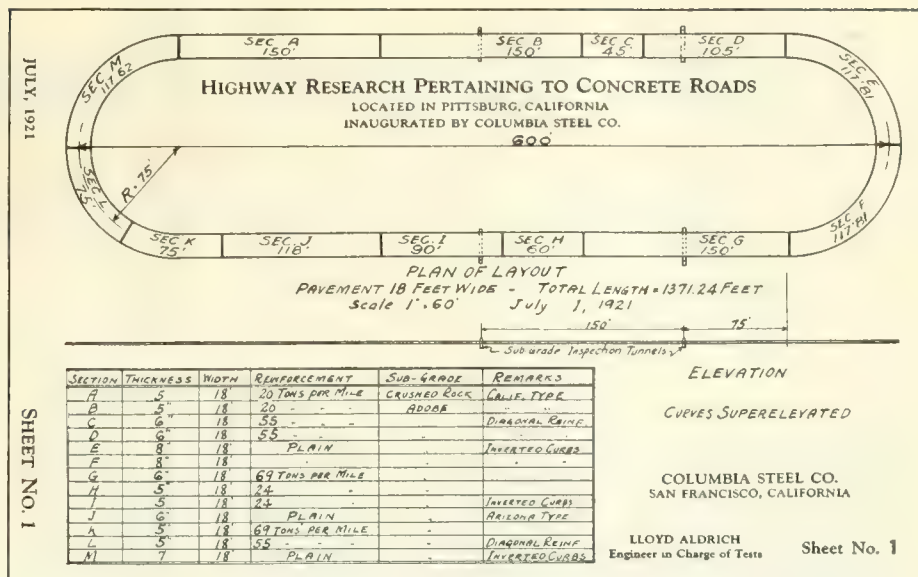
The surface of the test highway has been marked off into 6 ft. squares, which are numbered and lettered in such a manner that a progress record will be made of all cracks. As a crack appears in any section of the test highway it will be recorded on a chart. When the test is completed, the chart will show the location of every crack in any section of the test highway.

A novel feature in connection with this test highway is the fact that it is built in the form of a race track, a general view of which is shown at the top of page 14. The road is 18 ft. wide and 1371 ft. in length on the center line. It is made up of thirteen sections of pavement differing in design as well as in the quality and location of the reinforcements.

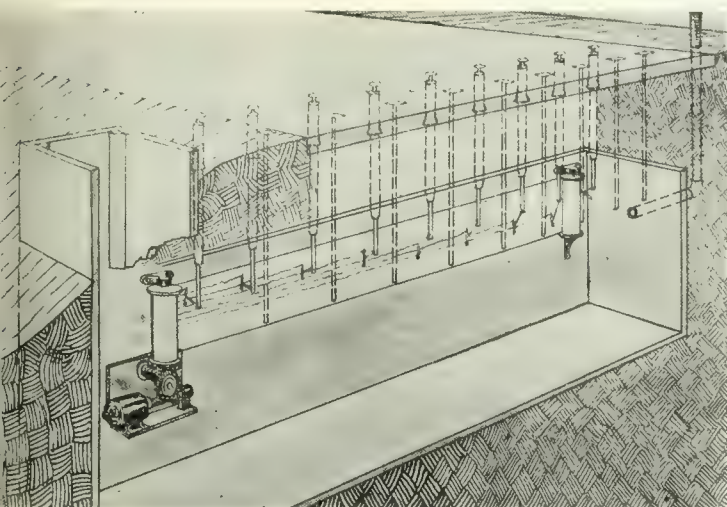
A set of scales of 50 ton capacity has been provided for weighing the various trucks taking part in the test. In order that the tests may be carried on at night as well, a powerful flood light has been erected which will completely illumine the entire test highway, enabling a person to read a newspaper at the far end of the track.

## Road Engineers Co-operated

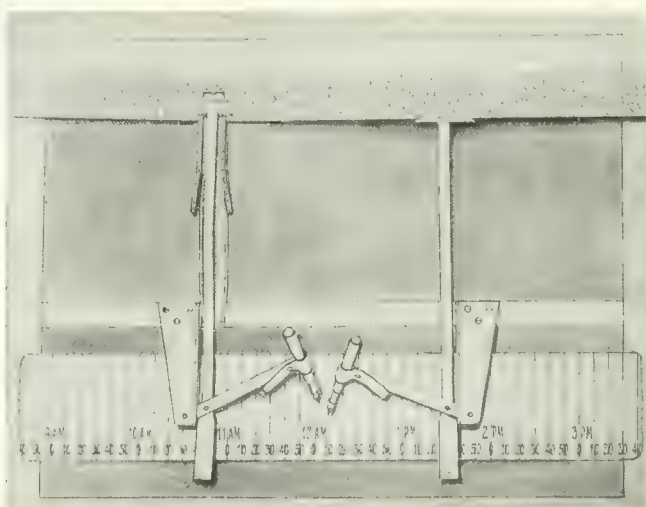
Before starting the building of this test highway, questionnaires were sent to the highway engineers of the state asking for their views as to what should be included in the test or for any other suggestions which they might care to make. The state and federal engineers were also consulted with the same object in view. The hearty co-operation of all was freely given. As a result, the thirteen types of road construction selected were those most nearly conforming to all the views given. The thirteen types include both plain and reinforced concrete in thicknesses varying from 5 to 8 inches.



The upper illustration is a plan view of the track, showing the thirteen different sections into which it is subdivided, the amount of reinforcement, construction, thickness, etc. The lower illustration is a sectional view of one of the sections, section A. Each of these sections will represent a standard type of road construction and the test will show how these types stand up under the most severe strains



These are the self-recording flexure instruments, imbedded in the concrete slab. Rods, to which pens are attached, extend down into the tunnels. These pens will record the flexure of the slabs as trucks pass over them above



The soil deflection rods are provided with a plate at one end which rests directly under the concrete slab. These rods are equipped with recorders for the purpose of observing the deflection of the sub-grade

# Your Midwest Truck Engine

## Part 2—Lubrication and Overhaul

By Otis E. Griner\*

ON the Midwest engine, an automatically controlled by-pass valve is connected to the gasoline intake manifold by a copper tube.

The crankshaft is completely drilled with a 7/16 in. diameter hole from end to end. The lubricating oil enters the rear main bearing under pressure of oil pump, passes completely through the shaft, lubricating main and connecting rod bearings, also camshaft bearings—and escapes through the by-pass valve at front main bearing. By this operation the volume of oil passing through these bearings is made directly proportional to the load on the engine at any given moment and not to the engine speed.

### Vacuum Lubricating Control

With engine idling or under light load, the throttle is partially closed and the vacuum (or suction) developed in the cylinder lifts the oil control valve and allows oil to pass out freely from front end of crankshaft. As additional load is placed on the engine, the throttle valve is opened further to admit more fuel. This causes more "pull" by vacuum on the incoming fuel and less lifting action on the oil control piston. As this piston nears its seat the outflow of oil from the front end of the crankshaft is held back. At the same time the oil pressure on oil entering rear end of this shaft is increased and engine speeds up to take care of increased load and the oil in shaft—caught between two pressures—is forced into main and connecting rod bearings in volume sufficient to lubricate these bearings properly for the increased load on engine.

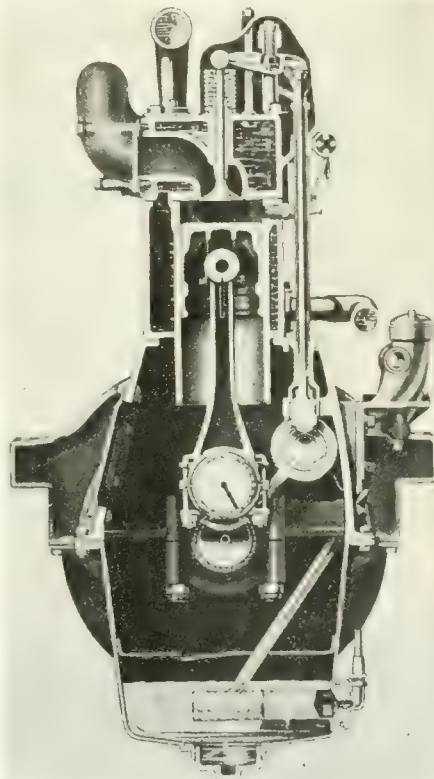
The position of the oil leads in the crankshaft forces the oil into the bottom side of all connecting rod bearings ahead of the bearing pressures.

No oil grooves or shims are used. There is no direct lead for the oil to pass out of the connecting rod bearings, and it must spiral to the outside edge in an unbroken film.

On the Models 400 and 402 the oil control piston is adjusted at the factory to show approximately 15 lb. pressure (gauge) when engine is idling and 60-65 lb. at full load. The Models 408 and 409 carry pressure of about 10 lb. idling and 50-55 lb. at full load.

These pressures will show on gage. The pressure is regulated by the spring

in the regulating valve, the spring being made stronger or weaker by adjusting the nut on the crankcase in front of the front cylinder. To raise pressure, loosen vacuum line connection and lock nut and screw down the large body nut to which tube connects one or more turns while the engine is running. Change in pressure will be noted on gage. When proper pressure is reached, tighten lock nut securely, and connect vacuum line fittings.



Section view of Midwest engine, showing features of design

Pressure, with light oils, will not be as high as with heavy oils.

At this point it is well to call attention to the absolute necessity for a pressure gage of 100 lb. capacity, or greater. This pressure gage should be placed where it will be in full view of the operator at all times, as the gage reading, showing pressure on oil system, is the only guarantee which the operator will have that the engine is receiving proper lubrication. The tubing used, if of any length, should contain a coil or two in order to permit

absorption of vibration and avoid breakage of pipe or tube.

The camshaft bearings also have force feed lubrication, leads being drilled in the upper half of engine crankcase. These lead the oil directly from the crankshaft main bearings to camshaft bearings. The cylinder walls and pistons are lubricated by oil thrown from the connecting rod bearings onto the lower part of the cylinder walls. The pistons are relieved opposite the ends of the piston pins and pick up the oil from the cylinder walls at this point, forcing it around the piston pins, to lubricate the piston pin bearings.

### Oil Pump Inspection

The geared oil pump located on the timing gearcase cover (Models 400 and 402) and on rear end upper crankcase (Models 408 and 409), can be removed without taking off the gear cover. It is held in place by five cap screws, dowels being used to locate the oil pump body cover and prevent misalignment when replacing it on the engine. It is well to inspect the oil pump when going over the engine to know that the gears are in good condition. Attention should be given when oil pump is replaced to secure perfect gasketing of the pump body, as an air leak into the pump will reduce the oil pressure and may cause injury to engine bearing surfaces. Also, the brass unions connecting suction and pressure oil tubing lines to pump must be tight and leak-proof for the same reason.

### Crankshaft and Main Bearings

The main bearing caps (front, center and rear) are all of different dimensions which should allow no chance for confusion in reassembly. The main bearings are bronze backed and removable, 1/4 in. thick with 3/32 in. babbitt lining. These bearings have a scraped fit in both the crankcase and caps, being securely anchored with countersunk brass screws. End thrust is taken care of at the rear main bearing, since larger flanges and greater rigidity are obtainable at this point.

The crankshaft and also connecting rod bearings are fitted with .004 in. clearance.

When the engine is torn down, inspection should be made of the bearing surfaces on crankshaft main and connecting rod bearings to see that the original clear-

\*Service engineer, Midwest Engine Co., Indianapolis, Ind.



ances of .004 in. to .005 in. have not increased to more than .010 in. to .012 in.

In case of bearing trouble necessitating the replacement of connecting rod bearings, the crankshaft must be removed and the 7/16-in. drilled oil hole running its entire length, cleaned out with compressed air and gasoline to remove all particles of babbitt, etc. If necessary, the pipe plugs closing the drilling through crankpins and arms may be removed with socket wrench to aid in this cleansing operation. Both main and connecting rod bearings supplied for replacement purposes can be installed without special fitting. All main bearings furnished separately are interchangeable with those on engines. When a connecting rod bearing needs replacement, a new connecting rod and cap, fitted with connecting rod cap bolts and properly bushed is furnished; upon return of the old connecting rod, cap and bolts, credit is extended to cover all except the cost of rebabbiting. This arrangement, which is necessitated because the babbitt bearings in Midwest connecting rods are poured and fastened directly to the rod and cap forgings, saves much labor in making the installation of new rods. By fusing and holding the babbitt solidly in the rod and cap forging, the heat, due to the bearing friction, is conducted away the more readily and no chance given for the babbitt to creep and distort.

## Valve Mechanism

It is necessary to consider the camshaft, push rod base, push rods and tubes, rocker arms, valves, stanchion bar and rocker arm adjusting pins in any explanation covering the operation of the overhead valve mechanism on these engines. The valve lifters or roller type are held in gray iron guides and this sub-assembly is known as the push rod base assembly. Each push rod base is easily removed from the outside of the engine, also any one of the push rods and tubes may be removed separately.

The eight push rod tubes enclosing the push rod bodies are the passage ways through which a constant spray of lubricant passes to the valve cover. This oil spray lubricates the valve lifter rollers, push rod base guides and rocker arms and in addition keeps the long steel push rods at a constant temperature.

The rocker arms used are of full rocker type with non-slippage action at the point of fulcrum. The wearing surfaces in contact are of large area, that on the rocker arm being convex, and on the rocker arm adjusting screw flat in shape, giving rolling contact between these surfaces. The rocker arm is held centered on the adjusting screw at all times, regardless of any wear occurring at this point.

The adjusting screws are threaded into the stanchion bar and can be adjusted while the engine is running. To adjust intake and exhaust valves a clearance of .004 in.-.005 in. should be allowed between top of push rod and rocker arm when engine is cold.

The rocker arms have their bearing point of fulcrum off center. The length of rocker arm from bearing point to push rod is slightly more than half the length from bearing point to valve stem. The .004 to .005-in. clearance at push rods will therefore give a .006 to .008-in. clearance between valve stem and rocker arm.

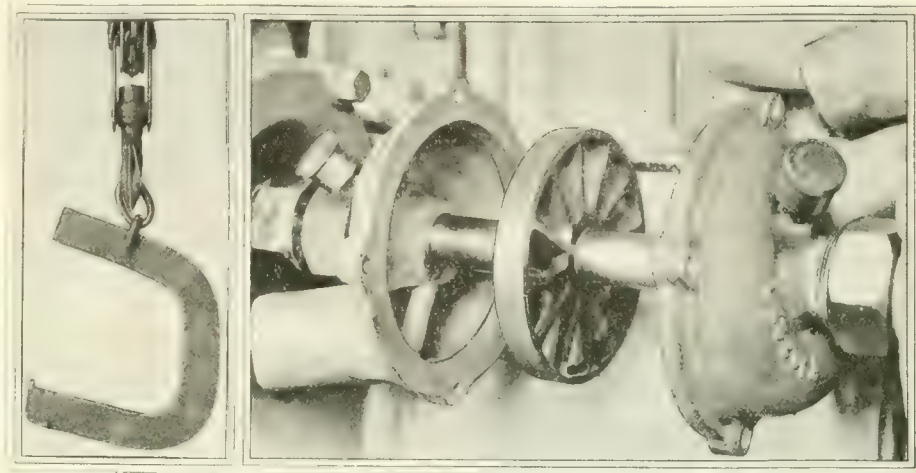
These push rod-rocker arm clearances should be checked and readjusted regularly. Lesser clearances will cause valves to hold open, which causes loss of power, damage to valves and valve seats, etc.

An indication of improperly adjusted

and upper crankcase. It is unnecessary to disturb either the flywheel housing or gearcase cover.

A cork gasket provides a leak-proof joint between oil pan and flywheel housing and either paper or composition gaskets are used between pan and crankcase. Care must be taken to insure that these gaskets are not damaged when oil pan is removed so that an air tight fit must always be maintained.

With the removable flywheel housing the engine flywheel can be removed without taking the crankshaft from crankcase. The standard Midwest flywheel housings conform to S. A. E. standard



Hook for lifting engine from frame

Water pump assembly which is located on the magneto driving shaft

intake valves is sometimes given by rapid fluctuation of the gage needles on the oil pressure system. If an intake valve rides open, part of the compression pressures will back up in the intake manifold and because of the short intervals of alternate pressure and suction, the control piston will rapidly approach and recede from its seat, causing erratic gage readings.

The gage needle fluctuations should be recognized as calling attention either to improperly adjusted valves or an oil control piston which is in need of adjustment.

## Water Pump Assembly

The water pump is located on the magneto driving shaft. The water pump assembly including magneto shaft and gear, pump body and impeller, can be removed from the outside of the engine as a unit. This pump is of the floating propulsion type and has a bronze impeller (runner) brazed to the shaft. Right and left hand packing nuts are supplied on this shaft and composition packing used to avoid water leaks.

The only two grease cups on these engines are on the water pump. They should be frequently filled with a good graphite grease.

Both the flywheel housing and oil pan are separate from the (upper) engine crankcase. The oil pan can be removed by disconnecting the suction oil line to sump and removal of the cap screws and bolts fastening it to the gearcase cover

dimensions for frame mounting bolt centers, although special housings are furnished when necessary. Standard No. 2 S. A. E. flanges are provided for mounting of starting motor on both right and left hand sides of flywheel housings.

## Timing Gear Cover

This gearcase cover can be removed to allow inspection of timing gears. After oil pump suction and pressure lines are disconnected, the removal of fan drive pulley, gear case trunnion block, fan belt and fan, and gearcase cap screws will allow it to be lifted off without injury to the gasket. To prevent oil leakage this gasket must be in good condition when gear cover is replaced.

On the five-gear timing gear cover furnished for truck engines when lighting and starting units are to be used, a No. 2 S. A. E. flange is provided for mounting of generator. Before removing timing gears the engine should be placed on dead center, and it will be noted that the timing gears are marked so that there need be no difficulty when replacing gears to insure that they come in the same relation as originally, and that the timing will be correct.

The cylinder head and entire combustion chamber are machined to insure even compression and power development per cylinder. It is most important that inspection be made and valves resealed after engine has been operated

(Continued on page 33)

# How Accurate Costs Won the Bid

## In Contracting to Handle City Ash Removal

By F. Eugene Spooner

WHETHER operating one or 100 trucks, it certainly pays in the long run to keep accurate cost records. The mere fact that only one truck is being operated does not detract from the necessity of "knowing what your truck is doing" or what it can do under certain circumstances. The time will come when accurate cost data will come in mighty handy when a decision in your business calls for promptness and accuracy.

Take, for instance, the case of C. R. Firth, who operates a 2-ton Acme truck at Crum Lynne, Pa. Back in 1920, the city of Chester, Pa., called for bids on ash collection work and as these bids had to be figured on a very close margin of profit, it was absolutely necessary that the bidder be sure of his ground as regards the cost of operation of any type of vehicle that he might select for the work.

### Cost Figures Gave Answer

Firth, who had prepared for just such an occasion, had only to glance at his cost figures to determine just how closely he could bid on the contract. From past performances with this and other trucks as well as with horse drawn vehicles, he had it all figured out about what it would cost him per cubic yard to collect ashes and dump them. Moreover, it was a simple matter for him to determine whether a motor truck or horse drawn vehicle was to be selected or not.

Having operated horses for 25 years and motor trucks for 3 years, he knew how they compared on every kind of work. He figured that on ash collection that it would take three teams to do the work of the 2-ton Acme. Each team would need one helper and would cost about \$13 a day. The three teams, therefore, would cost \$39 a day, or a little more than \$16 above the cost of the 2-ton truck. Figuring that the truck operated 5 days a week, this meant a saving of over \$4,300 a year.

In addition to the difference in operating costs between the truck and horses, Firth figured that the horses would not be as dependable as the truck, because in hot weather they are often overcome by the heat, while in cold weather they slip and slide and often injure themselves. He also found it hard to get their shoes sharpened in the winter, because the minute there was ice on the ground, there was bound to be a long

line of horses waiting at the blacksmith shop.

Since working on the contract, Firth's truck has been running 5 days a week. In the morning it makes a 2-mile run to Chester, starting in on its ash collection work as soon as it reaches the city. The truck operates with two helpers, who go along beside it, picking up the boxes and

baskets of ashes and dumping them into the truck. It is Firth's plan to get the main streets cleaned before the big business rush commences, in order to avoid congestion caused by the parking of passenger cars in the downtown district.

As a rule the truck covers three or four blocks to get a load. As soon as it has about 4 cu. yds. of ashes, it starts

The Commercial Vehicle—Truck Cost System			
6 Month ending <u>March 22</u> 1921			
Make of truck <u>Acme</u>		Gasoline <u>Electric</u>	
MONTHLY COST SUMMARY SHEETS U. P. C. BOOK COMPANY, INC. 243 249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline <u>819</u> gals.	33¢	\$	270.27
Current <u>        </u> kw-h			
Oil <u>117</u> qts.	11½¢		13.46
Grease <u>        </u> lbs.			
Kerosene <u>        </u> gals.			
Waste <u>        </u> lbs.			
Dist. Water <u>        </u> gals.			
Driver <u>117</u> days	\$13		1521.00
Helper <u>        </u> days			
Mechanic <u>        </u> hrs.			
<b>A—Total Operating Charges</b>			\$ 1804.73
<b>Maintenance Charges</b>			
*Tires <u>4680</u> miles	\$ .0236	\$	110.45
Repairs <u>        </u>			67.16
Overhauling, painting, etc.			
Spare vehicle rental	<u>None</u>		
Garage rental (pro rata)			
<b>B—Total maintenance charges</b>			\$ 177.61
<b>Fixed Charges</b>			
Insurance, fire <u>        </u>	per year	\$	69.68
Liability <u>\$139.35</u>	per year		
Collision <u>        </u>	per year		
Interest <u>6</u>	(On Item 1 <u>6.48</u> gals. @ 10¢)		52.74
Depreciation on chassis			
Depreciation on body	\$ .0547 per mile		256.00
Depreciation on equipment	\$ .4436 @ 60,000 miles		
*Depreciation on tires			
Total taxes and licenses			
<u>Administrative Overhead</u>			
<u>Estimated @ \$500. per year</u>		250.00	\$ 628.42
<b>C—Total fixed charges</b>			\$ 2610.76
*Note: Omit one of these			

Above are shown the cost items on the 2-ton Acme for the 6-month period. The charge for the license is not shown here (\$30 per year, or \$15 for this period) but as the administrative overhead is an estimated figure the license may be included in it, although this procedure is not recommended as a general practice, as it is confusing



on its trip to the dump. This trip may vary in length from three blocks up to 2 miles each way. Since the truck has a dump body, it takes only a moment to unload, after which it starts back for the next load.

The truck has been averaging between twelve and fifteen trips to the dump a day. Upon completion of its work, it is run back to Crum Lynne. On some days the truck ends up about 4 miles from the garage. It averages 40 miles a day and in spite of a great deal of running at low speed as well as the power required to operate the dump body, it gets 5.7 miles to a gallon of gasoline.

In addition to the ash collection work, the truck is sent once a month to Philadelphia to bring back a load of feed. Occasionally it is hired out to do general hauling for other people. There are usually odd jobs to be had for a dump truck.

In looking over the accompanying

cost records it will be noted that the repair bills on this truck are extremely low. The excellent care given the truck

What the System Costs

On these two pages are shown filled-in sample sheets of the Standard Cost Keeping System for Motor Trucks as devised by THE COMMERCIAL VEHICLE and sold at cost by The U. P. C. Book Co., Inc., 241-249 West 39th Street, New York. The cost of the complete system including binder, 500 cards and 50 sheets is \$12.50, delivered. Additional sheets may be purchased in packages of 50 at \$2. Extra cards may be obtained in packages of 500 for \$6.

has been repaid by a low repair cost. The truck has never been laid up for a day. This is remarkable, because the roads near the dumps are extremely rough and the truck has to back over glass, tin cans, etc., whenever it dumps a load. In the winter, the engine never stops running throughout the day.

Actual Repair Cost

So far Firth has been able to keep the same driver on the Acme. He is an excellent driver and takes good care of the truck. When anything does go wrong requiring expert attention, the truck is sent to a Philadelphia dealer where it receives prompt service.

Repair bills to date have included a frozen radiator and a snapped spring. Firth figures that \$150 a year should be ample to cover this item. He also figures that his time is occupied in handling the Acme truck, another 2-tonner and sixteen horses, so that \$500 a year of his salary should be charged against the Acme.

It will be noticed that garage rental has been left out. Firth states that this has been done because he keeps the truck in a building of his own that would not be used for any other purpose.

The driver is paid \$5 a day while the helpers are each paid \$4 a day. Firth has always found that it pays to treat his drivers well and to keep them interested in their job. If they work hard and get through early in the afternoon, he always lets them off for the day. This helps to keep them feeling more willing to work overtime when necessary.

In looking over the accompanying cost figures for 6 months of operation, some interesting information is brought out. Under operating charges, it will be noted that the driver receives \$13 a day. This amount really takes care of two helpers as well as the driver.

What Recapitulation Shows

Though Firth's operating charges amount to over 69 per cent of the total cost of operation, this charge would ordinarily be low in comparison with other operating charges were it possible to eliminate the two helpers' wages.

So far, repairs have been estimated at \$67.16. The heaviest maintenance charge is tire depreciation which amounts to \$.0236 per mile. Firth paid \$236 for his tires and as his truck ran 4680 miles during the 6-month period, the depreciation amounted to \$110.45.

Fixed charges amount to a little over 24 per cent of the total cost of operation. The license charge for the truck is \$30 a year. This would amount to \$15 for the 6 months and would increase the total cost for the 6 months to \$2,625.76. As the administrative overhead is an estimated amount, however, the license charge may be said to be included in it, although grouping this charge with administrative overhead is not recommended as a general practice. Firth has figured his depreciation on the chassis, body and equipment on the basis of a 60,000-mile life. The complete cost of the vehicle brings this depreciation to \$.0547 per mile, or \$256 for the period.

The Commercial Vehicle—Truck Cost System

Number of Truck 2773  
Capacity in lbs. 4000 Chassis No.

MONTHLY COST SUMMARY SHEETS

U. P. C. BOOK COMPANY, INC. 241-249 WEST 39TH ST. NEW YORK

Investment

Cost of chassis, less tires		
Cost of body		\$ 3280 00
Cost of equipment		
Cost of tires		236 00
1 Total cost, complete		\$ 3516 00

Performance Record

2 Days operated	117
3 Days idle	64
4 Days maintained (Item 2, Item 3) (9/22/20 to 3/22/21)	181
5 Total hours operated	936
6 Total miles covered	4680
7 Total trips made	1580
8 Total <del>tons or packages or stops</del> Cubic Yards	6316

Performance Averages

9 Average miles per day maintained (Item 6—Item 4)	25.9
10 Average miles per day operated (Item 6—Item 2)	40
11 Average miles per trip (Item 6—Item 7)	3
12 Average <del>tons or packages or stops</del> Cubic Yards per trip (Item 8—Item 7)	4
13 Average commercial <del>ton miles per day</del> Cubic Yard Miles (Item 11 x Item 12) 2	6

Recapitulation

14—Total expenses for 6 months (Sum of Items A, B and C)	2610.76
15 Cost per day operated (Item 14—Item 2)	22.31
16 Cost per day maintained (Item 14—Item 4)	14.42
17—Cost per mile operated (Item 14—Item 6)	.5579
18 Total commercial <del>ton miles per day</del> Cubic Yard Miles (Item 7 x Item 13)	948
19 Cost per commercial <del>ton mile per day</del> Cubic Yard Mile (Item 14—Item 18)	.2754
20—Cost per Cubic Yard (Item 14 : Item 8)	.4134

In working out the recapitulation from the performance record shown above and from the total cost for the six-month period, as shown on the opposite page, the unit taken here is the cubic yard, that being the unit on which the operator's charges are based. The unit selected should always be that on which charges are based, whenever possible

# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 587—Overhead Light Controlled from Floor

A FIXED flood light for the shop at one position on the ceiling is not the most desirable or convenient arrangement inasmuch as shadows and dark places result when a truck is driven into the shop. To avoid this situation a repair shop arranged a flood light on a swinging arm, as shown in the accompanying illustration, with an extension for rotating it from the floor and placing the light over the truck, as desired.

The bracket for this light was made inexpensively and quickly from pipe material, a horizontal piece being placed at the ceiling. This was coupled by means of an elbow to a vertical section, and at a convenient place to reach, a short section was secured as a handle to the vertical part by a pipe "tee." The wiring was led through the "tee" and out at the end of the swinging arm, where the lamp socket and reflector were screwed into a coupling.

Two straps fixed the vertical section to a column so that it was free to be rotated by hand. The light swings through a large arc, the size depending, of course, upon the length of pipe used. The light is easily placed at the most desirable position throughout the length of the truck.—W. SWAYNE, Syracuse, N. Y.

## No. 588—Removing a Heavy Truck Wheel

REMOVAL of a heavy truck wheel without suitable equipment designed for the purpose is a problem that is always of interest to fleet owners, especially those that operate large trucks. The accompanying illustration shows one way in which this difficulty has been overcome.

Jack up the rear wheel and slip a 1-in. board under the wheel. This board should be wide enough to allow the placing of a small block of wood on each side of the wheel in order to stop the wheel from rolling off. After this has been done, place two rollers, wood, pipe or broomstick, one at the center of the wheel and the other under the outer end of the board.

After the wheel has been rolled off remove one of the small blocks on the board in order to permit rolling the wheel off the board onto the floor.—THOMAS J. BURNS, San Francisco, Cal.

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

## No. 589—Device for Heating Truck Cab

ONE of the essential requirements for successful operation of trucks is the comfort of the driver. In winter, especially, it is necessary to see that the driver is kept warm and comfortable. On long runs at night or during the day when cold wintry weather has set in, no driver can remain comfortable without some heating arrangement.

As a result of this necessity, there are now on the truck market several heating devices that have as their heating source the exhaust of the engine. The accompanying illustration shows another method of utilizing heat of exhaust.

All that is needed is a rain spout. This is cut to fit on the side of the exhaust manifold and should be long enough to run the length of the engine up to the dash. One end is closed while the other is open. The latter fits in a 3-in. hole cut in the dash. As a result of this opening in the dash, the heat from the exhaust manifold is permitted to warm the cab. After the cab has been heated sufficiently enough to give comfort, it is possible to close a metal slide over the hole in the dash.—C. A. NEWQUIST, Lebanon, Ky.

## No. 590—Device for Lapping In Piston Pins

WHEN the piston pins need lining up, it is a good plan to lap in the bushings. The accompanying illustration shows a good way in which to perform this operation. Take a piece of well polished pipe whose length will equal that of the piston bore and whose diameter will give it a snug fit in the piston pin bushings. Then insert in this pipe a piece of  $\frac{3}{8}$ -in. stock, threaded, as shown in the illustration. Placing washers on either end and locking the threaded stock to the pipe permits rotation that will accomplish the lapping-in operation.—WILLIAM WIPPER, Gobel's Garage, Brooklyn, N. Y.

## No. 591—Keeping Track of Bolts and Screws

WHEN removing the manifold, crankcase or other parts where there are a number of bolts or cap screws, it is very important to put each bolt back in the same hole from which it came. This can easily be accomplished by taking a piece of sheet metal and drilling a number of holes in it. Place these bolts in said holes, remembering where number one was placed and also where number one was taken from in the case. It will then be easy to replace all bolts in their proper holes.—NATHAN S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

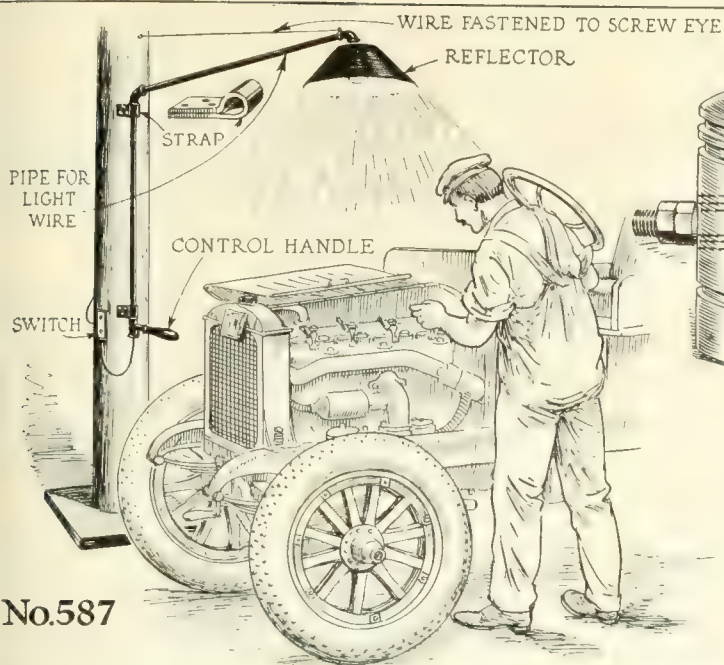
## No. 592—Diameter Gage for Lathe

A GAGE made from a plate  $\frac{1}{4}$  or  $\frac{1}{2}$  in. thick is kept on the tailstock and is useful for setting the tool to approximately the correct cut. Finish cuts should, of course, be made according to caliper measurements.—S. E. GIBBS, Corydon, Iowa.

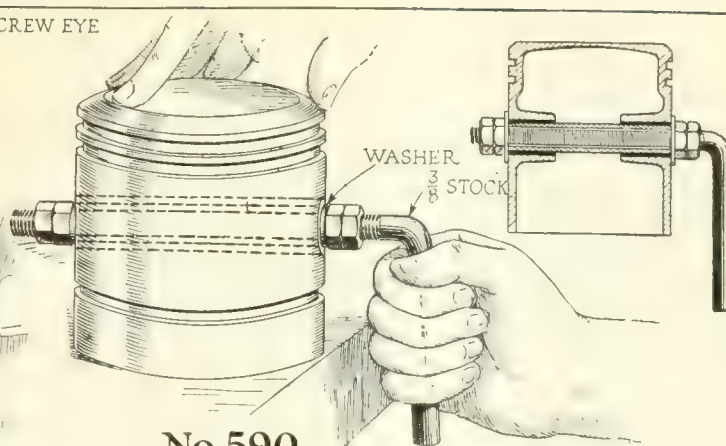
## No. 593—Tool for Inserting Valve Keys

DIFFICULTY is often experienced during valve work because of inaccessibility of valve key positions. The accompanying illustration shows a tool for inserting valve keys. This is made by drilling the handles of a small pair of pliers and inserting a coil spring, as shown. This prevents the valve key from dropping when pressure is released by hand.—H. MOONEY, Worcester, N. Y.

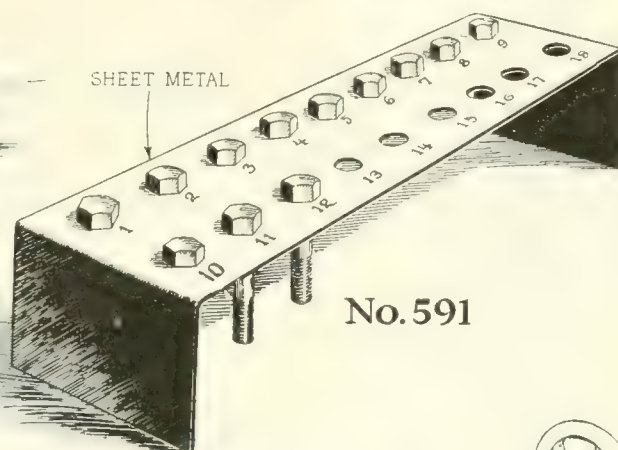




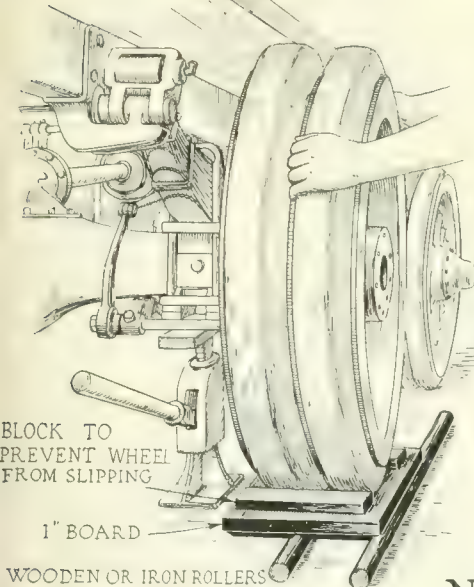
No.587



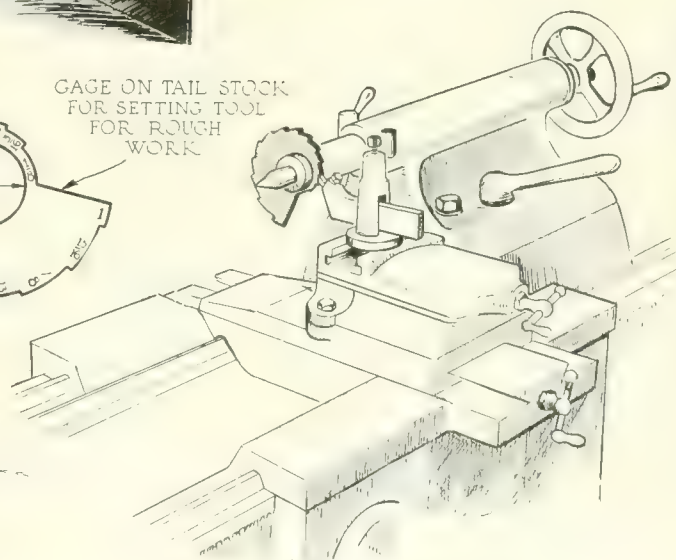
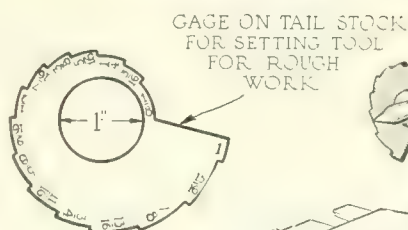
No.590



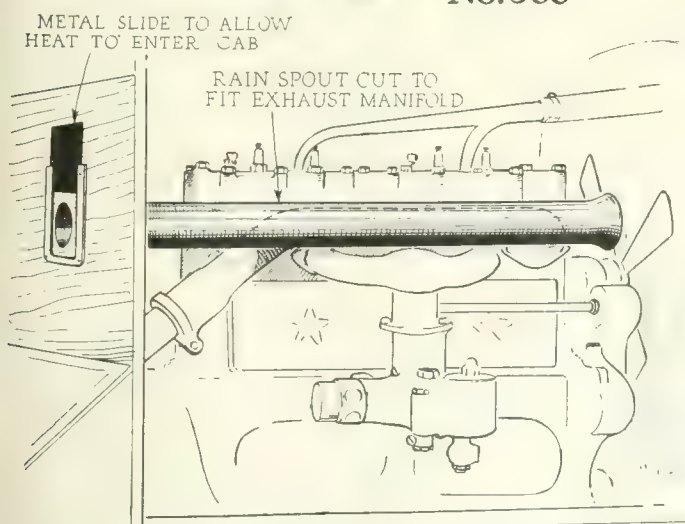
No.591



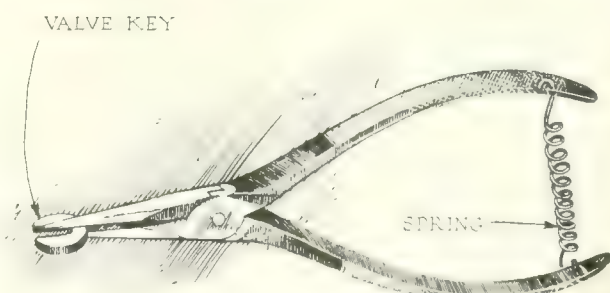
No.588



No.592



No.589



No.593

### No. 594—Winding Springs in Lathes

MANY mechanics know the procedure for winding springs in a lathe; however, only a few know the method which produces the longest spring in one part or the surest method of feeding the wire on the mandrel to obtain a uniform tension and a uniform pitch. In the method, as shown in the accompanying illustration, a spring 20 in. or more in length has been wound from piano wire, with a uniform pitch to the coils, on a mandrel  $\frac{1}{8}$  in. in diameter.

To feed the wire and hold it for sufficient tension, two blocks of red fiber or of oak are placed with the wire between them, in the tool post, and pressure is applied by means of the tool post screw.

The ends of the block are run out with the cross feed until these bear against and act as a steady rest for the mandrel. The back gears are set for a feed to give the pitch, as in cutting a screw. These methods take the guesswork out of spring winding, and instead of the springs being in the usual short lengths, a couple of feet of spring is turned out at once and is cut up as required.—FRED TODD, Chicago.

### No. 595—Preventing Overflow in Cleaning Tank

WHEN running a steam hose into a tank of cleaning solution the steam condenses and makes the solution run over. This condition also thins the solution. By running a coil of pipe into the tank it can be heated up just as well.—ADAM HERR, Gobel's Garage, Brooklyn, N. Y.

### No. 596—String Instead of Paper Gasket

IN many gearcases instead of using a paper gasket it is well to place the cover on and start all of the cap screws. Then wind a string, as shown in the accompanying illustration. This forms a perfectly oiltight gasket when the screws are all tight. Perhaps one of the first things at bench work a young repairman is taught on entering a shop is that of cutting gaskets. If care is not exercised in removing the gearcase, the paper gasket may easily be damaged by part of it adhering to the gearcase. Though a new one may be easily made, still it takes valuable time. The use of string in place of a paper gasket is a time saver as well as being simple in application.—NATHAN S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

### No. 597—Soldering Iron for Radiator Work

A HEAVY iron is tipped with threaded lugs, the end of the soldering iron being cut off square and drilled and capped. The tips are made of heavy copper electric cable. The heavy body of the iron will hold the heat a long time.—C. R. PIERSON, Medina, N. Y.

### No. 598—Portable Light Stand in Shop

WHEN lighting conditions in a shop are such as to require the use of electric lights for work under the trucks or around the engines, it is a good plan to eliminate any chance of bulb breakage or rotting of the insulation on the wire. Frequently the wire is left on the floor where it becomes covered with water, oil or mud, and as a result, bulbs are broken or the insulation is rotted. These replacements are expensive in the long run and should be avoided.

The accompanying illustration shows a good way in which to avoid this loss. The stand is made about 6 ft. high and anchored to a base heavy enough to keep it from tipping. The perpendicular has a ring at the top through which a cord passes, keeping the cord out of the water and mud. The bulb, when not in use, sets in a clamp located half way up the perpendicular.—D. H. HOLLEPP, Algona, Iowa.

### No. 599—Bench With Drain for Washing Parts

THE accompanying illustration shows a simple method of fitting a bench for washing truck parts to avoid the kerosene's draining on the floor and making a messy job. In addition, the kerosene or gasoline used for washing the parts is recovered and can be used over again.

The edges of the bench are fitted with 3-in. troughs all around. A down spout is fixed at one end with a bucket hanging underneath to catch the liquid. The trough is slanted slightly to insure the flow of the liquid. This can be applied to practically any bench and the saving in the cleaning fluid rapidly pays the cost of the material used. By the use of two buckets a continuous supply of fluid cleaner is always at hand.

In some truck shops, where the stand is some distance from the disassembling section of the garage, some progressive fleet owners use an overhead crane for transfer of the heavy truck parts to and from the wash stand. When not so fortunately equipped, the usual practice is to use portable carriers.—W. GOODRICH, Chicago.

### No. 600—Lacing a Fan Belt for Small Pulley

THE method of lacing the fan belt shown in the accompanying illustration is simple and efficient. It is stated that this method of lacing is especially applicable for small pulleys and that the lacing will last longer than the belt.—C. A. NEWQUIST, Lebanon, Ky.

### No. 601—Buggy Springs for Driver's Seat

THE accompanying illustration shows a good way in which to obtain easy riding qualities on the truck seat. An old full-elliptic buggy spring, two pieces of angle iron, two uprights, two cross

arms and two braces for the uprights are all that are needed for the job.

The two springs are bolted to the angle irons, the latter being in turn bolted on the outside of the frame side members. The uprights, which are bolted at middle of the springs, support the seat on cross arms which are bolted to the bottom of the seat. Braces on either side of the uprights keep the latter in position.—C. A. NEWQUIST, Lebanon, Ky.

### Against the "Truck Road Hog"

PHILADELPHIA, Oct. 5.—The Motor Truck Association of Philadelphia, in connection with its big drive for membership, has launched intensive propaganda for the elimination of the "truck road hog," not only from the highways of Pennsylvania, but from the United States.

The association's board of directors recently took up plans to obtain the co-operation of truck owners throughout the State to better control the operation of their trucks on the highways. Already much literature on the subject has been issued by the association. Walter Y. Anthony, president of the association, says of the movement:

"We motor truck men want to be worthy the approval of the general public, instead of receiving its criticism and the only way to secure that approval is through the men who own the trucks. It is to the owner's interest to have his truck carefully driven to make it last longer and to render better service, if nothing else. He is also interested in keeping down insurance rates which are based on the average of accidents. This movement should appeal to every motor truck owner in the country."

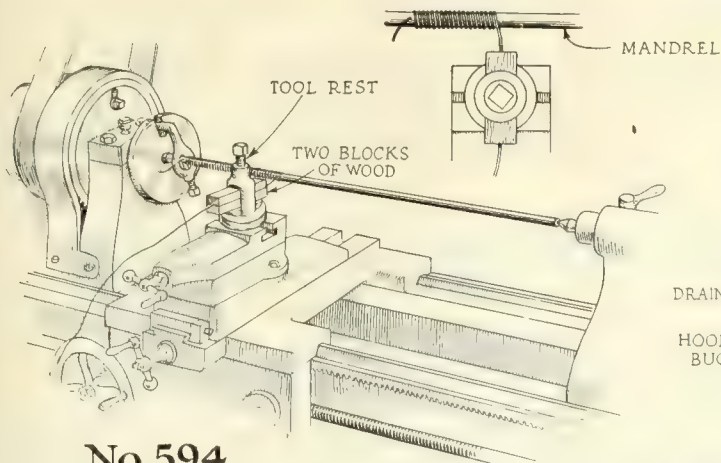
### Ohio Weight Limit Raises Protest

COLUMBUS, Oct. 4.—Haulage companies and truck owners of Ohio are up in arms over the new law enacted at the last session of the Ohio General Assembly limiting the weight of motor trucks and their loads at 10 tons. This law, which passed several months ago became effective the latter part of August as the Ohio constitution provides for 90 days in which to file referendum petitions. The new law supersedes a former law in which the maximum weight of truck loads was 11 tons.

Haulage concerns report that the effect of the new law will be to put out of business a number of their large trucks as well as to reduce the efficiency of the five-ton truck.

A determined effort was made by the Ohio Association of Commercial Haulers as well as private trucking companies to have Governor Harry L. Davis veto the law but his excellency refused to take such a stand. The Governor realized that the law was crudely drawn in a number of respects but he did not want to take the responsibility of defeating the legislation which has for its object the protection of the improved highways and streets of the State.

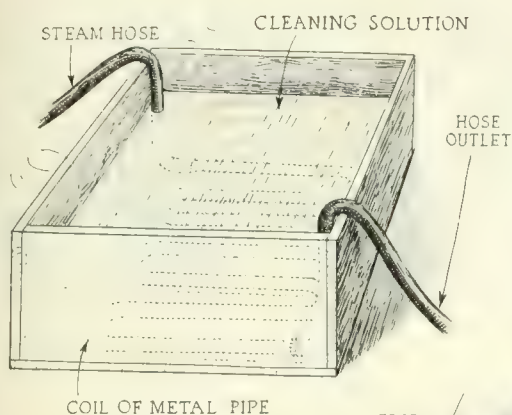




No. 594

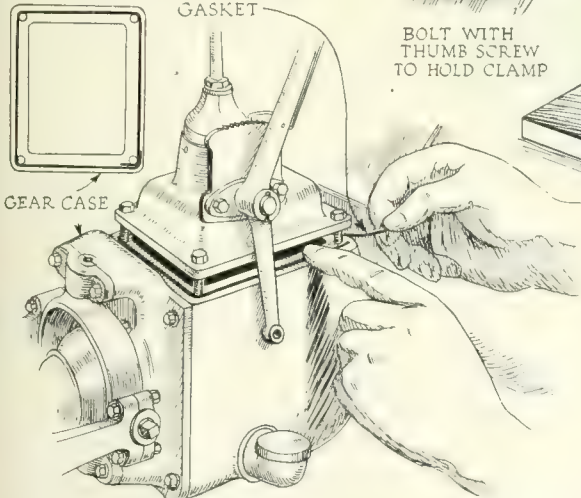


No. 599

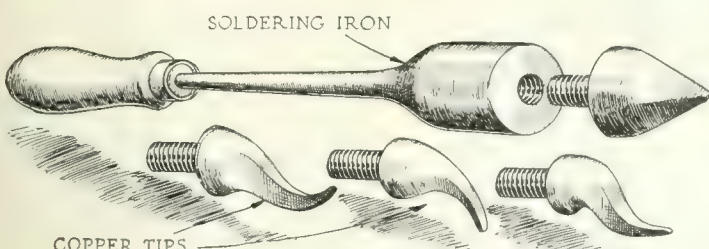


No. 595

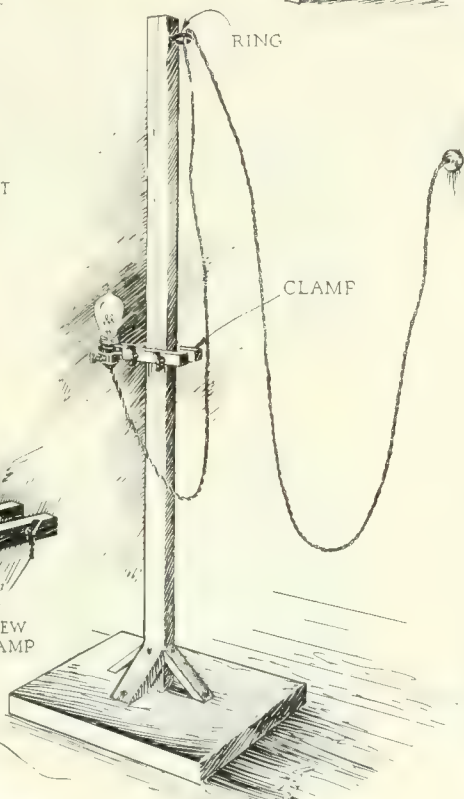
STRING WOUND AROUND  
CAP SCREW IN PLACE OF  
GASKET



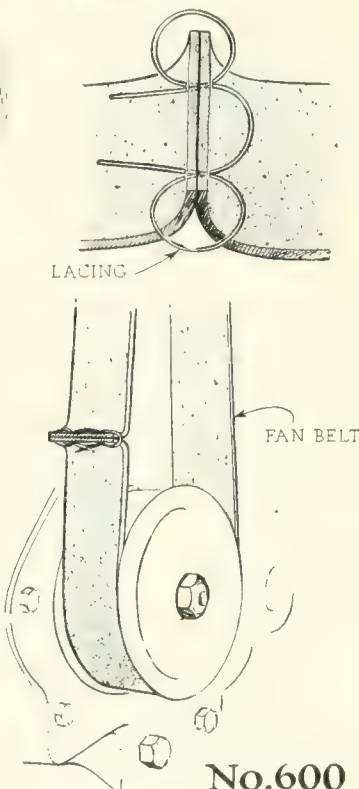
No. 596



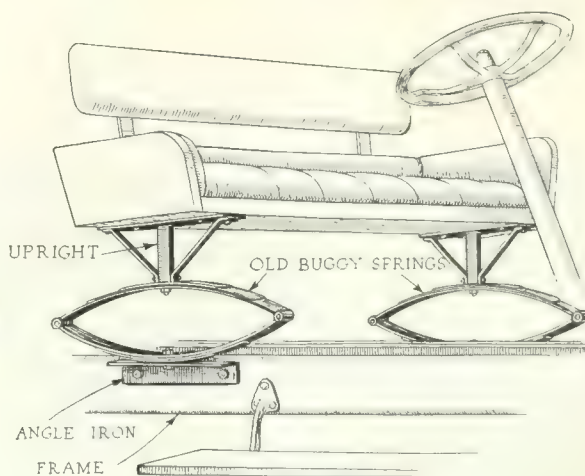
No. 597



No. 598



No. 600



No. 601

# Buyer's Department of The Commercial Vehicle

## Trucks Disassembled When Shipped

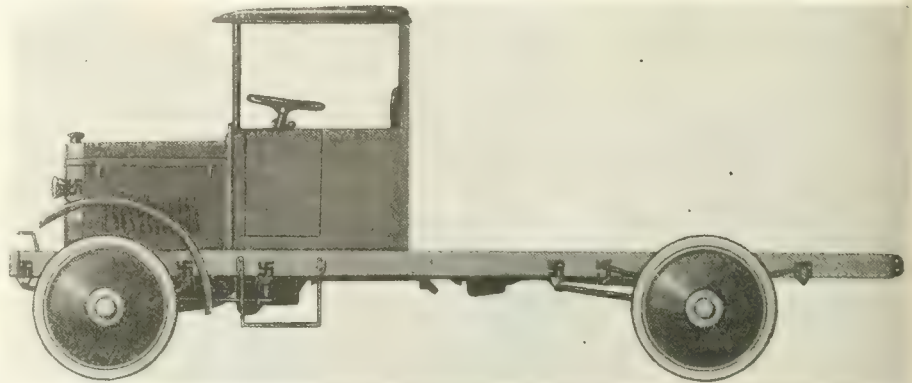
*Royal Rex Company Reduces Transportation Charges Under New Plan*

A NEW departure in truck shipments between factory and dealers that will interest fleet owners is being featured by the Royal Rex Motors Co., Chicago. The outstanding feature is the shipment of trucks in boxes and cases instead of total units. By the use of this method, the transportation charges are very materially reduced and the shipments are arranged and packed in such a way that the truck can be assembled at the point of destination with a minimum amount of time and labor.

It is stated that any one of the Rex models can be completely assembled or disassembled in 4 hrs. by two mechanics with the aid of two wrenches, a hammer and a screw driver. The frame can be entirely taken apart for shipment. There are no rivets in the entire frame construction. Bolts of special alloy, tempered and treated, with self-securing lock washers and nuts are used throughout. The designers have included a sub-frame made of seasoned air-dried structural one-piece timber (filling the entire side-frame rails and cross members.) This has been included so as to absorb vibration.

Other features in design include a steel cradle for the engine to rest on while it is at the same time suspended at three points. This permits the engine to be moved for repairs and inspection, if necessary, but so aligned that it can be pulled out or put into place in 20 min. time.

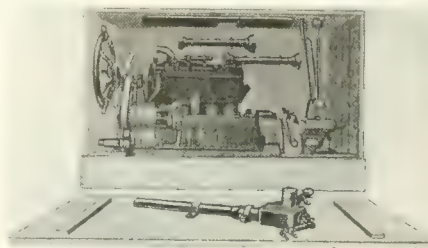
The Rex company is manufacturing six models in the following capacities:



Side view of new Royal Rex truck

1, 1½, 2, 2½, 3½ and 5-ton. The prices are respectively \$1,850, \$2,150, \$2,675,

throughout, that being also true of the 2 and 2½-ton models, and the other two models as well. In other words, with the six models there are only three different sets of brackets. These at the same time are interchangeable and can be used on either side of the truck.



Method of shipping powerplant

\$2,850, \$3,700 and \$4,300. These prices include solid tires. The same brackets are used on the 1 and 1½-ton models

### Saving in Freight Charges

The saving in freight charges by this method of shipping in boxes runs from 70 to 146 per cent on domestic shipments, is shown in the accompanying table. All Rex trucks are assembled and tested equal to a road run of 100 miles. When O. K'd by the inspector they are disassembled, boxed and made ready for shipment. Besides testing, these trucks it is stated must go under hydraulic resistance carrying a load equal to 100 per cent more than its carrying capacity for 8 hrs. without stopping.

Well known units are included in the assembly of these trucks. They are as follows: Buda four-cylinder engine; Stromberg carbureter; Fuller clutch and gearset; Bosch magneto; Pierce governor; Timken front and rear axles; Tuthill springs; Ross steering gear; and Merchant & Evans universal joints.

### Lumen Branch in Chicago

BUFFALO, N. Y., Oct. 6.—The Lumen Bearing Co., this city and Youngstown, Ohio, and maker of machine bronze, brass and bronze castings and bearings, solders and babbitts, has found it necessary to open a branch in Chicago at 15 North Jefferson Street.

### Shipment Costs Compared Under Royal Rex Plan

	THE NEW WAY Knocked Down—Capacity 36 ft. Car, 20 to a Carload	THE OLD WAY Set Up—2 to a Carload— Minimum 12,000 lbs.	Saving
Chicago to New York	3rd Class \$1.17½ per hundred.\$47.00	2nd Class \$1.38½ per hundred.\$53.10	\$36.10 or 77%
Chicago to Pittsburgh, Pa.	3rd Class \$0.78 per hundred...\$31.20	2nd Class \$0.92 per hundred...\$55.20	\$24.00 or 79%
Chicago to Boston, Mass.	3rd Class \$1.23 per hundred...\$49.20	2nd Class \$1.44½ per hundred.\$86.70	\$37.50 or 77%
Chicago to Atlanta	3rd Class \$1.91½ per hundred \$76.60	2nd Class \$2.20 per hundred..\$132.00	\$55.40 or 70%
Chicago to Charlotte, N. C.	3rd Class \$1.96 per hundred...\$78.60	2nd Class \$2.23 per hundred..\$133.80	\$55.20 or 70%
Chicago to Birmingham, Ala.	3rd Class \$1.76 per hundred...\$70.40	2nd Class \$2.04 per hundred..\$122.40	\$52.00 or 73%
Chicago to Denver, Colo.	3rd Class \$1.85½ per hundred.\$74.20	1st Class \$3.04 per hundred..\$182.40	\$108.20 or 146%
Chicago to Dallas, Tex.	3rd Class \$1.96 per hundred...\$78.40	1st Class \$2.82 per hundred..\$169.20	\$90.80 or 116%
Chicago to Los Angeles, Cal.	3rd Class \$4.08½ per hundred \$163.40	1st Class \$5.66½ per hundred \$339.90	\$176.50 or 108%



## Buyer's Department of The Commercial Vehicle

### Detroit Trailer Has Four Rear Wheels

*Maker Claims It Saves Streets on Excessive Tonnage*

THE Detroit Trailer Co., Detroit, has brought out a heavy duty semi-trailer with a rated capacity of 20 tons. This trailer has four wheels in the rear mounted on two axles. The feature of this job is the fact that it saves the streets on excessive tonnage. Tests made show that these wheels do not drop in street holes as they do on a trailer that simply has two wheels in the rear. The minute one of the wheels hits the hole instead of dropping in same, it immediately transfers the load to the other three wheels and there is no downward action of the springs beyond 3 in. The spring action is upward.

On tests this trailer has demonstrated that a street full of holes does not give the hard pull that it does on two wheel jobs. It can readily be seen that this trailer will act as a roller to gravel roads and instead of tearing them up will keep them in first class condition.

The designers of this new trailer had in mind those States that have adopted 800 lb. per inch width of tire service. Dayton steel wheels with 40 by 12 in. tires are used. This gives 38,400 lbs. on the rear tires. If the rear tires on the truck have a 14-in. width, it will give



*Side view of new Detroit 20-ton trailer, showing four wheels mounted on two separate axles on the rear*

an additional 22,400 lbs. or 60,800 lbs. on the six wheels which support the semi-trailer, as all the springs, shackles,



*Rear view of Detroit trailer*

axles, wheels and frames will have a safety of approximately 8 to 1 on a rating of 20 tons.

These jobs are built with the chassis 18, 20 and 22 ft. long and 8 ft. wide. The trailer is especially adaptable for the haulage of milk, as the platform is large enough to carry a cold storage body with a full carload of milk.

Specifications in additions to Mansfield axles and steel frames call for Timken bearings and Detroit springs. The radius rods on the axles are ball-jointed to take extreme variations in road surface. The list price has been fixed at \$2,750.

### Bell Resumes Production on 1-Tonner

#### BELL SPECIFICATIONS

Capacity, tons.....	1
Price .....	\$1,495
Wheelbase, in. ....	120
Tires, front.....	35 x 5
Tires, rear.....	35 x 5
Bore, in. ....	.35%
Stroke, in. ....	.51%
N. A. C. C. hp. ....	21.08
Gear ratio in high gear.....	7.2 to 1
Final drive .....	Worm

THE Bell Truck Sales Corp., Ottumwa, Iowa, has resumed capacity production on the Model M 1-ton worm-driven Special. This model has been on the market for more than a year and sells with complete equipment including driver's seat, pneumatic cord tires, acetylene lights, tool kit, jack, pump and Buell whistle. The weight of the truck with full equipment is 2550 lbs.

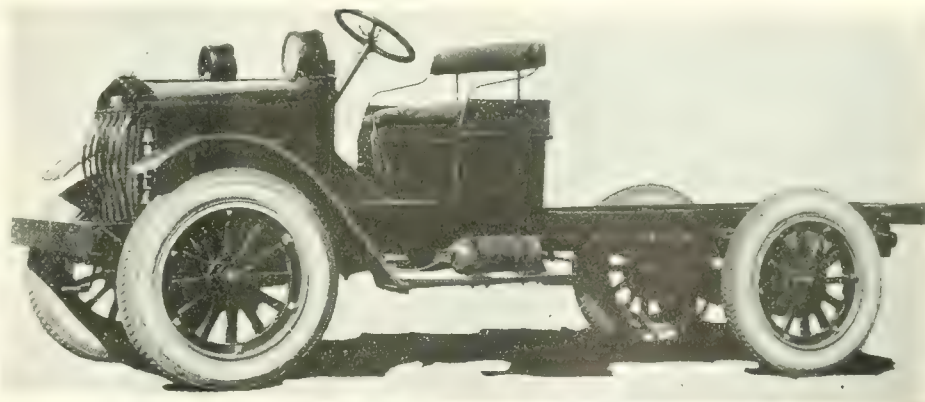
Specifications include a four-cylinder Buda engine; Eisemann high tension magneto equipped with impulse starter; Zenith carbureter; Borg & Beck multiple-disk clutch; and Stewart vacuum tank.

The powerplant is suspended at three points. Cooling is taken care of by a centrifugal water pump and a 15-in. fan. Oil is forced to all bearings by a pump.

An extra large radiator with removable core and sides is used. This is set

on shock absorbing springs and is protected in the front by a heavy guard.

The three speed selective gearset is a unit with the powerplant. The rear axle is of the full-floating type with both emergency brakes enclosed. Both emergency and service brakes are internal-expanding.



*Chassis view of 1-ton Bell truck*



# Buyer's Department of The Commercial Vehicle

## Ringless Piston

THIS piston is made in two parts, the outer shell or sleeve and the inner core. In assembling the piston the inner core is screwed into the shell, which is designed and machined to a true cylinder and is made from .002 to .003 in. less in diameter than the inside of the piston. The cylinder is filled by the oil film fed by the splash of the oil on the lower end of the cylinder wall, which works its way in partly by the action of the piston and partly by the capillary action of the oil.

Naturally, it might be supposed that the pressure at the time of explosion would force out this oil film and that the power would be materially cut down by leakage into the crankcase. It is claimed, however, that the capillary action of the oil film is not disturbed under momentary pressure.

Inasmuch as the piston shell surface is always cylindrical because of the absence of rings, the oil film is unbroken and at no point do the metallic surfaces of pistons or cylinders come into contact.

The maker is the Ringless Piston Co., 103 Park Avenue, New York City.

## Gasolarm

SAID to operate when the fuel supply has fallen to the two- or five-gal. level, the Gasolarm, made for installation in either Ford or Chevrolet gasoline tanks, give an unmistakable, insistent warning that it is time to refill. In fact, it gives several warnings before the final one as every time a corner is rounded the variation in the gasoline level sets it off.

The mechanism of the device is simple, consisting of a clock works, a float and a bell. The whole is contained in a cylindrical body which is inserted into the tank through the filler hole, a threaded top piece taking the place of the regular filler cap. The price is \$2.50 and the manufacturer is the Gasolarm Co., 2541 Schubert Avenue, Chicago.

## New Cylinder Head Gasket

A DEPARTURE in cylinder head gasket construction is shown by the gasket manufactured by the Victor Mfg. & Gasket Co., 5750 Roosevelt Road, Chicago. The new gasket is practically identical with the conventional type of asbestos lined copper and brass gasket, with the exception that the top sheet is of a special non-absorbent, heat-resisting fibre. Aside from the fact that the fibre surface is less liable to stick to the cylinder head than the metallic sheet, it is claimed that the new gasket is cheaper to produce and that consequently it sells at a lower price. It is made

## Truck Accessories

in two types, the Victor No. 101-A, in which the outer edge is turned over, making a closed gasket, and the 101-B, with plain edges.

## Cushion-Coils

THIS is a shock absorber for the Ford truck. It is made entirely of steel stampings with brass bushings and is provided with oilers at all moving points. It is finished in black enamel. Under compression each coil of the absorber telescopes inside another. To check all upthrow, a special shoulder arrangement in the arch levers of the Cushion-Coils comes in contact with the under side of the Ford leaf spring at the instant of rebound, thus giving an automatic snubbing action. The price is \$21. The manufacturer is the Pressed Metal Mfg. Co., Waukesha, Wis.

## New Stafford Carbureter

IN this carbureter an automatic air valve regulates the flow of air and a meter pin and tapered orifice of the flow of fuel. The fuel is sprayed into the air stream through a number of minute jets, spaced around the distributor head. The only adjustment is made by screwing the tapered orifice, at the bottom of the carbureter, up or down until the correct adjustment is obtained. This adjustment is made at idling speed and is then correct for all other speeds. Prices range from \$20 to \$50. The manufacturer is the Jones-Neihoff Mfg. Co., Los Angeles, Cal.

## BZ Spark Plug

IN this plug the insulator is inserted through the bottom of the steel shell and the shell is crimped at the bottom. This design allows the formation of a solid steel shoulder inside near the top of the shell to hold the insulator against compression. The electrodes are not contained in a chamber. The Ford size has a hollow core insulator that is said to shed oil. This plug is made in sizes to fit all standard trucks. The manufacturer is the Bodin Spark Plug Co., 1106 Court Street, Allentown, Pa.

## Ensign Model "E" Carbureter

THE new model Ensign carbureter has a manual starting control and a new type of idling adjustment. The choke is arranged so that instead of cutting off the air supply it is said to give a higher velocity in the vortex chamber. The adjustments are placed on the top of the carbureter where they are easily acces-

sible. The prices are as follows: 1 in. \$25; 1¼ in., \$27.50; 1½, \$30; 1¾ in., \$35. The maker is the Ensign Carbureter Co., 217 East Seventeenth Street, Los Angeles, Cal.

## Gasoline Injector for Fords

A DEVICE for priming the manifold of the Ford engine. The injector is screwed into the intake manifold and is connected to the gasoline line through a three-way connection which replaces the usual carbureter connection. The plunger in the injector is operated from the dash by means of a cable. The price is \$3.50. The manufacturer is the J. & B. Mfg. Co., Pittsfield, Mass.

## Spyroseal Rings

THE features of this cast, one-piece piston ring are the long laps and open slots between the laps. The laps extend two-thirds of the way around the ring circumference. The maker is the Spyroseal Mfg. Co., 1926 Gravois Avenue, St. Louis, Mo.

## Drednaut Shock Absorber

A COIL spring is used to absorb the rebound in this shock absorber. It is installed in place of the regular spring shackle and has a lever which attaches to the frame. High grade material is said to be used in the construction throughout. The manufacturer is the Auto Specialties Mfg. Co., St. Joseph, Mich.

## Ladd Toe Grip Cleats

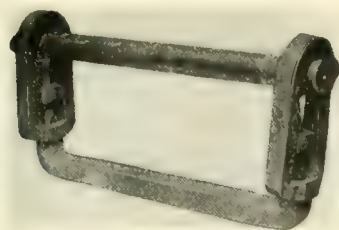
THESE cleats fasten around the tire and rim, and are locked in place by means of a bar which passes between the spokes. A complete set consists of ten units, five for each rear wheel. They are made for all sizes of tires from 3½ in. up to 10 in. The price per set is from \$65 up to \$120. The maker is the Traction Devices, Inc., 284 Thomas Street, Newark, N. J.

## Bethlehem Steel Truck Wheel

A ROLLED steel truck wheel in which the rim and spokes are formed in one piece is now being manufactured by the Bethlehem Steel Corp. The blank from which the wheel is formed is stamped in the first instance from a special rolled I-beam, portions of which form the spaces between spokes being cut away before the forming operation is started. When the wheel has been formed to assume a circular shape, the ends of the flange which then becomes the rim of the wheel are welded together and the inner spoke ends are bolted to a central hub member, alternate spokes being staggered and bolted to opposite sides of the hub flange.



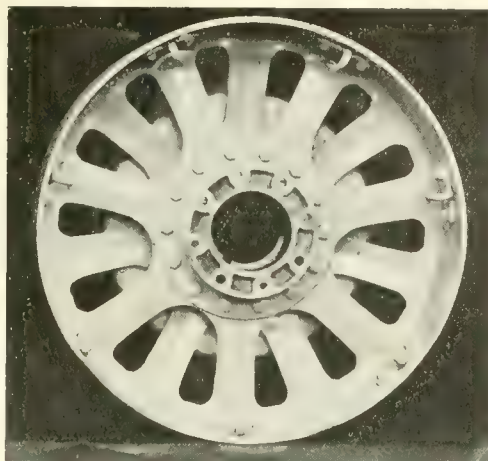
# Buyer's Department of The Commercial Vehicle



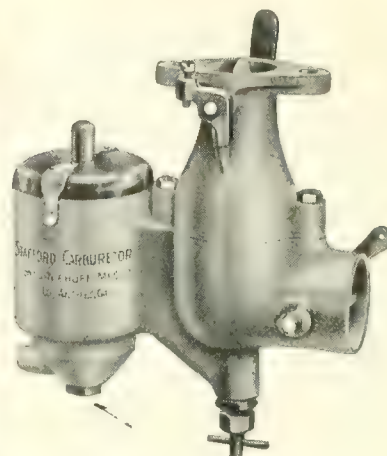
Ladd Toe Grip cleats



Cylinder head gasket



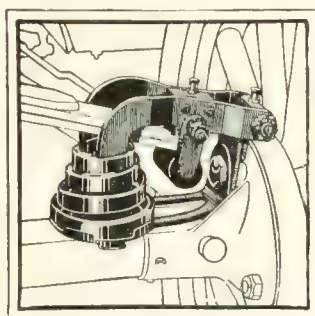
Bethlehem steel truck wheel



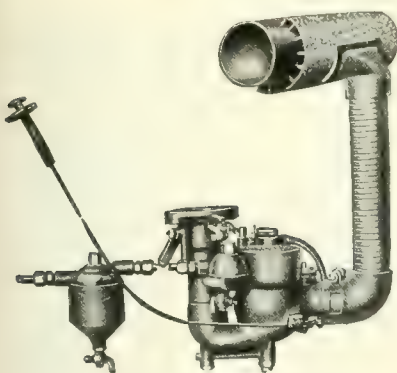
Stafford carburetor



Spyro seal rings



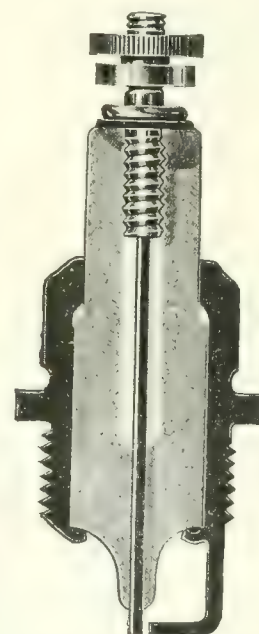
Cushion-Coils



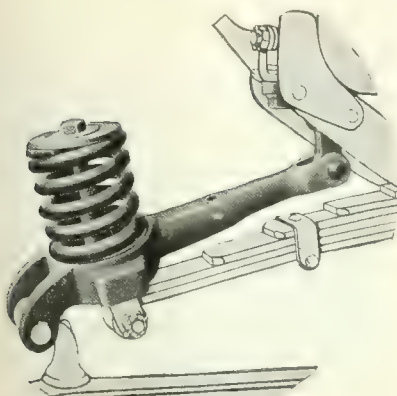
Ensign Model "E" carburetor



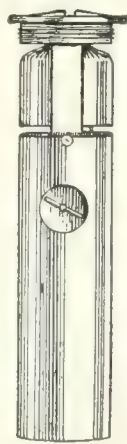
The shell and core of the Ringless piston



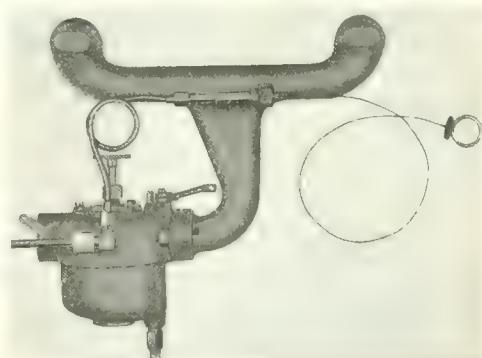
BZ spark plug



Drednaut shock absorbers for Fords



Gasalarm bell alarm



Gasoline injector for Fords

# Buyer's Department of The Commercial Vehicle

## E & S Valve Refacer

THIS valve refacing tool is designed to be held in a vise when in use. Three cutter blades are employed in this device, held in place by cap screws with the cutting edges slightly off center. To operate, place the valve in position and swing center into place. After the valve has been faced, tighten thumbscrew on feed rod and turn slowly to finish face. If the valve has no center, swing feed rod near center and tighten thumbscrew slightly. This will hold the center true. The makers are Einfeldt & Siem, 126 West First Street, Davenport, Iowa.

## Efficiency Five-In-One Tool

THE construction of this tool makes it possible to put it to five different uses. It is an 8-in. combination plier and wrench, of carbon steel, nickel-plated. The come-apart feature gives two standard size S wrenches, ½- and ⅝-in. The price is \$1.50. The maker is the Efficiency Tool Co., 472 Milwaukee Street, Milwaukee, Wis.

## "Red Devil" All Steel Screw-driver

MADE with a hollow handle, the all steel "Red Devil" screwdriver has many advantages over the conventional type of tool, among which is a combination of lightness and strength. The tool is made of two drop forgings which, after being shaped under the hammer, are welded together. The handle indicates the amount of careful thought expended on the design, being knurled to give a firm grip and slightly flattened on the end and sides so that it makes a serviceable hammer.

## Complete Battery Repair Kit Consists of Few Pieces

A STORAGE battery repair outfit with which, it is claimed, most of the operations of battery maintenance may be performed, consists of a pair of special pliers, a lead cutter with a leverage of 20 to 1, powerful enough to shear heavy pillar posts easily, a battery knife especially designed to get into corners, a coarse rasp, a fine file and a ball pein hammer. The price is \$8.50 for the complete outfit. It is manufactured by Heller Brothers Co., Newark, N. J.

## Compact Soldering Kit

A VERY compact soldering kit designed for the mechanic's equipment, or as part of the tool complement of a salesman's car, consists of a small alcohol blowtorch, one bar of aluminum solder, one coil of self-fluxing wire sol-

## Shop Equipment for Fleet Owners

der, and four patches, two of sheet tin and two of aluminum. Small repairs can be made without the use of a soldering iron. The price is \$1.50 and the manufacturer is the Brown Supply Co., 15 Chardon Avenue, Boston.

## Yankee Cutter

A SPECIAL tool for cutting brake lining belting. It handles all kinds and sizes of brake lining and belting up to 6 in. wide and ¾ in. thick. Power is secured through a rack and pinion movement which is operated by a lever. In case of wear or regrinding, the knives may be adjusted. Adjustable guides are provided on base and frame to insure the work lining up at right angle to knives. These tools are packed in individual wooden cases. The maker is the North Bros. Mfg. Co., Philadelphia, Pa.

## Ware Automatic Valve Adjuster and Silencer

THE silencers are attached by removing 1½ in. from the push rod, preferably at the top. A spring steel washer between the two units of the Ware valve adjuster keeps the tappet snug against the valve stem at all times. The eccentric mechanism adapts itself to changes in the length of the push rod due to heat. The price is \$2. The manufacturer is the Ware Products Co., 3916 North Fifth Street, Philadelphia, Pa.

## Standley Transmission Band Adjuster

THE band adjuster is a special tool which makes it possible to adjust the brake and transmission band of the Ford without removing the cover of the transmission case. Two styles are manufactured, one for use on Fords without starters, and one for use on Fords with starters. The manufacturer is the Standley Skid Chain Co., Boone, Iowa.

## Morenco Universal Reamer

THE reamer is capable of adjustment to .0001 of an inch. Each reamer holder is furnished with several sets of blades, four blades per set, ten sets in all. Each set of blades will expand or contract ¼ in. The connecting rod is held in the aligning tool during the reaming operation. Made by Moore Engineering Co., Hagerstown, Md.

## B-W Tester

THIS instrument is used for testing Ford coil units, single and double contact lamps, and spark plugs. The case is of hardwood dark walnut satin wax finish, on which is mounted an accurate low reading ammeter, coil guides with contacts and spark gap. It is fitted with a high grade indicating toggle switch. The tester is furnished in two types, one for direct current and one for alternating current. The price of the former is \$11.65, the latter being priced at \$14.35. The maker is the B-W Electric Co., St. Louis, Mo.

## Veco Bearing Cap Vise

THIS vise is designed to hold the main bearing caps of the Ford engine and also the rod caps, while they are being fitted. The hardened steel pins in the jaws of the vise are interchangeable for the two sizes ¾ and ½ in. and both sizes are furnished with the tool. It may be bolted to the vise or held in the jaws of an ordinary bench vise by means of the bottom lug. The price is \$5. The maker is the Keystone Garage Equipment Co., 98 Park Place, New York City.

## Mephisto Adjustable Wrench

THIS wrench can be adjusted to any angle and the position of the angle maintained, regardless of the amount of pressure used to force the nut or the direction in which the handle is traveling. It is made in two sizes of 6 and 8 in. The smaller size per dozen net is priced at \$14.40, while the larger size per dozen net is \$16.50. The sales of this wrench are handled by the W. A. Ives Mfg. Co., Wallingford, Conn.

## Drysdale Stud Extractor

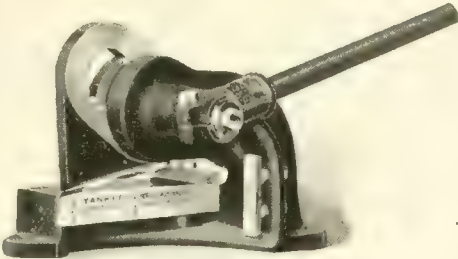
THIS is so designed that the driving or extracting operations can be performed without damaging or distorting the threads of the stud. It can be used in the most limited space, the body of the tool being no larger than the nut that fits the stud being driven or extracted. In use for driving a stud, the body is screwed over the stud and the sleeve tightened down, the stud being thus gripped by the split ends of the body. If the square end is held for a moment and the hexagon nut turned back the tool is released. In extracting when the tool has been screwed on to the stud, the square end is held while the sleeve is tightened up and, when tight, the stud can be withdrawn by screwing back by means of a wrench on the square end. The manufacturer is Alfred Herbert, Ltd., Coventry, England. Made in three sizes, as follows: ½-in. \$3.50; ⅝-in., \$4.25; and ¾-in., \$4.50.



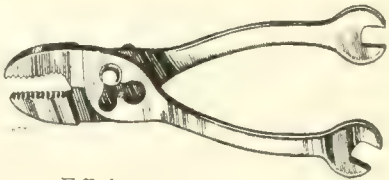
# Buyer's Department of The Commercial Vehicle



Storage battery repair outfit



Yankee cutter No. 2000



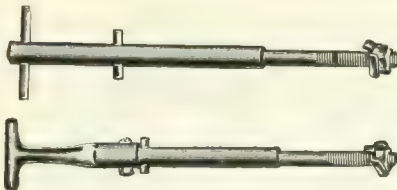
Efficiency five-in-one tool



Soldering kit



Red Devil all-steel screwdriver



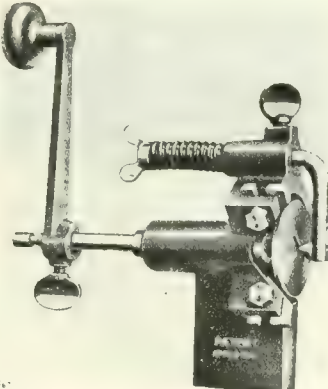
Standley transmission band adjusters



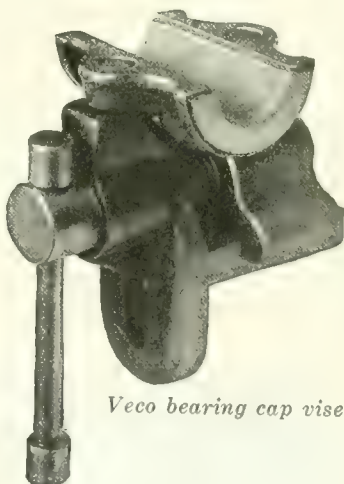
Moreno universal reamer and aligning tool



Vare automatic valve adjuster and silencer



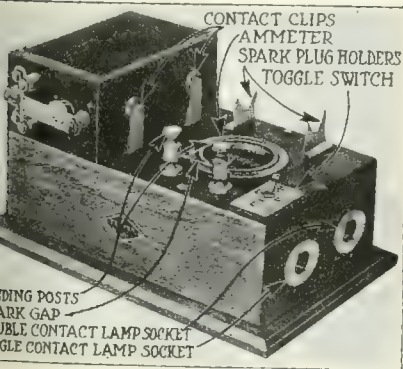
E & S valve refacer



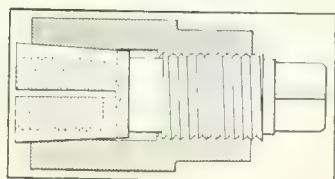
Veco bearing cap vise



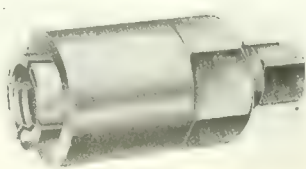
Mephisto adjustable wrench



B-W tester



Drysdale stud extractor



## Buyer's Department of The Commercial Vehicle

### Getting the Employees to the Plant

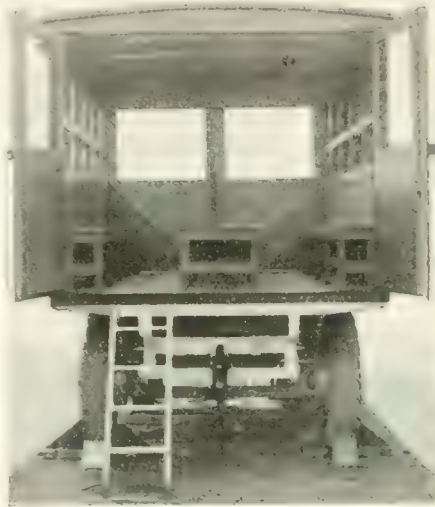
#### Trailer Makes You Independent of Local Transportation Facilities

THE question of using a trailer for the transportation of employees to and from the plant has often been considered by factory executives as a solution of local transportation problems. Where, for instance, a plant is located some distance from a town and is dependent entirely on transportation facilities for the prompt arrival of its employees in the morning as well as for the homeward journey at night, the operation of a trailer merits attention because of the economy in truck operation effected. This particular phase of trailer operation has been successfully worked out by the Beech-Nut Packing Co. at Canajoharie, N. Y.

The company in considering its transportation problem, had the following to contend with: Nearly eighty of its employees who lived in a town 6 miles from the plant; the uncertainty of local transportation facilities; and the most economical use of its own vehicles.

The three points brought out were so closely allied as to make solution of the problem a simple matter. By the use of a bus body on one of its trucks, it was found possible to carry from thirty to thirty-five employees on the trip to the plant. The addition of a 4-ton trailer with a regular enclosed body made it possible to carry forty-four more employees. The use of the two vehicles naturally gave the company the

*The Beech-Nut Packing Co.'s Employees Are Carried by Bus to the Plant from a Town 6 Miles Away*



*Rear view of the Beech-Nut trailer, showing seating arrangement*

necessary independence of local transportation facilities as well as effecting economy in truck operation.

The features connected with the use

of trailers are well known to most of the progressive fleet owners so that it seems necessary only to bring out briefly these features as related to the operation of trucks at the Beech-Nut plant.

In the first place, had the company chosen to transport its employees without the use of a trailer, its truck would have been forced to make two trips instead of only one. The use of two trucks to take care of all of the employees would have been just as uneconomical. Under the present arrangement, one truck and one driver are relieved of this duty for more important haulage.

Furthermore, the company has gone a step further in effecting truck economy. This has been accomplished by designing the seats in the trailer so that they may be taken out easily after each morning trip. The trailer can then be used during the rest of the day for carrying cargo.

Though the Beech-Nut company has no figures on the operation of the bus without the trailer, it is stated, however, that the difference in cost of operation with the trailer is a small matter.

The trailer is one of the regular line built by the Arcadia Trailer Corp., Newark, N. Y. The chassis is 14 ft. long and of the reversible type. The trailer has brakes which may be operated from the driver's cab by using the cable which operates the brake levers. The body is a regular enclosed type except that the upper section is cut away, curtains being used on the side and wired glass in the doors, which are on both ends.

The seats run lengthwise, there being one on each side with a double seat through the center. The passengers get into and out of the trailer by means of liberal sized stairs, which are swung into the body after the load is in.

Owing to the fact that this is a reversible trailer, it is impossible to have permanent steps that would be conveniently located. Therefore, the movable ladder is used as shown in the accompanying illustration. This is put on hooks which fastened to the end of the trailer body prevent slipping. The ladder is then taken up and pushed under the center bench or seat, which puts it entirely out of the way.

It is quite possible that non-reversible trailers would do just as well as the reversible trailer, and in such case, a permanent rear entrance could be made.

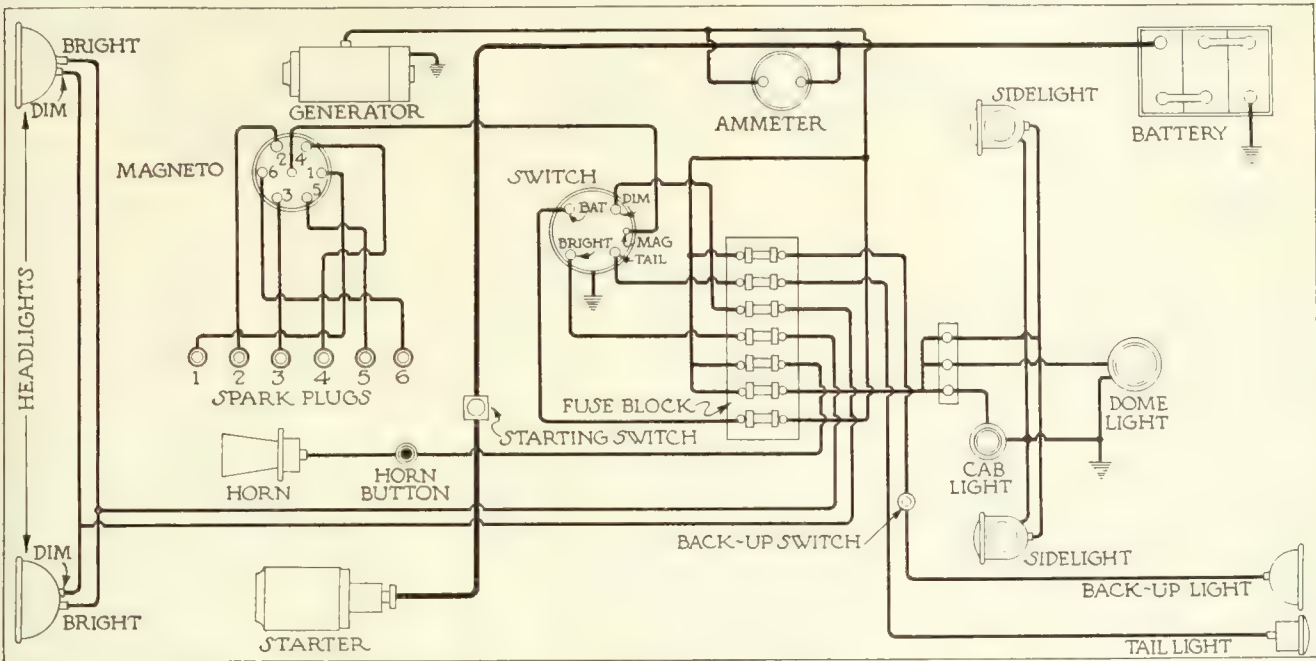


*This shows the trailer-bus combination on the trip to the plant in the morning. The trailer is also used for carrying cargo*



# Motor Truck Electric System Wiring Diagrams

## 40—Starting and Lighting Unit on Rock Falls Trucks



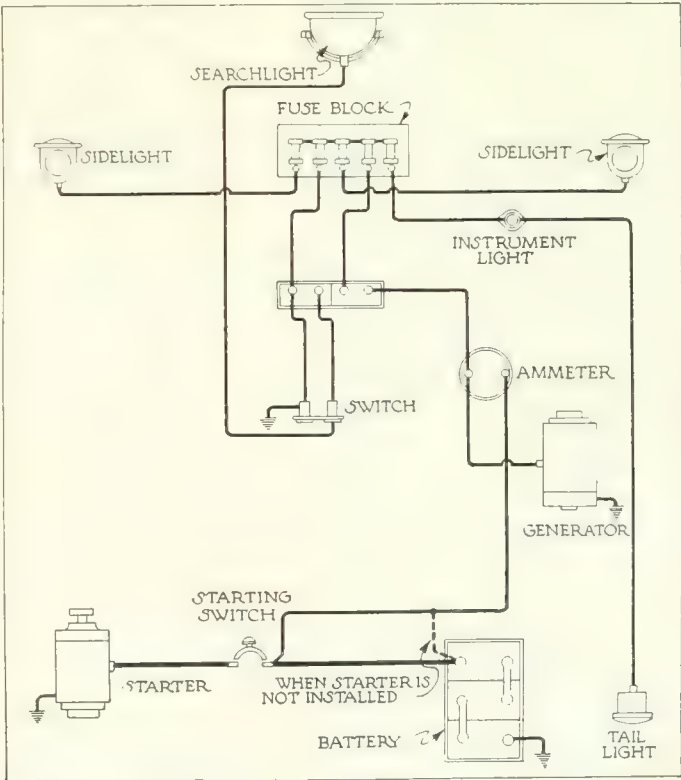
Starting and lighting system used on models 11, 12, 13 and 14 Rock Falls trucks

### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

1920	
1—Ford, Starting and Lighting	Oct. 1
2—Acme, Lighting	Oct. 15
3—Bethlehem, Starting and Lighting	Oct. 15
4—Atterbury, Lighting	Nov. 1
5—Ace, Starting and Lighting	Nov. 1
6—Atlas, Starting and Lighting	Nov. 15
7—Briscoe, Starting and Lighting	Nov. 15
8—Defiance, Starting and Lighting	Dec. 1
9—Commerce, Starting and Lighting	Dec. 1
10—Grant, Starting and Lighting	Dec. 15
11—Brockway, Starting	Dec. 15
1921	
12—Maxwell, Lighting	Jan. 15
13—International, Starting and Lighting	Feb. 1
14—Mack, Starting and Lighting	Feb. 15
15—Vim, Starting and Lighting	Mar. 1
16—Oldsmobile, Starting and Lighting	Mar. 15
17—Reo, Starting and Lighting	Apr. 1
18—Sterling, Starting and Lighting	Apr. 15
19—Stewart, Starting and Lighting	May 1
20—Kelly-Springfield, Starting and Lighting	May 15
21—Riker, Starting and Lighting	May 15
22—U. S., Starting and Lighting	June 1
23—Wilcox, Lighting	June 1
24—Pierce-Arrow, Starting and Lighting	June 15
25—Republic, Starting and Lighting	June 15
26—Parker, Starting and Lighting	July 1
27—Noble, Starting and Lighting	July 1
28—Oneida, Starting and Lighting	July 15
29—Oshkosh, Starting and Lighting	July 15
30—Knox, Starting and Lighting	Aug. 1
31—Master, Lighting	Aug. 1
32—Watson, Starting and Lighting	Aug. 15
33—Service, Lighting	Aug. 15
34—Packard, Starting and Lighting	Sept. 1
35—Tiffin, Starting and Lighting	Sept. 1
36—Napoleon, Starting and Lighting	Sept. 15
37—Dorris, Starting and Lighting	Sept. 15
38—Moreland, Lighting	Oct. 1
39—Northway, Starting and Lighting	Oct. 1
40—Rock Falls, Starting and Lighting	Oct. 15
41—Locomobile, Starting and Lighting	Oct. 15

## 39—Starting and Lighting Unit on Locomobile Trucks



Wiring diagram of the starting and lighting system used on the 3- and 4-ton Locomobile trucks



# The Fleet Owners' Forum

## Tire Mileage Guaranty and Its Effect on Truck Costs

To the Editor, COMMERCIAL VEHICLE:

Your September 15 issue contains on pages 16 and 18 a very interesting article on truck cost keeping methods in which the advantages of THE COMMERCIAL VEHICLE's system are pointed out.

We note, however, this system, as described in the last column of page 17, recommends that the cost per mile of the tire can be obtained by dividing their total cost by the *guaranteed mileage*.

This attitude is scarcely consistent with that taken by your other publications, notably MOTOR WORLD, in which the abolition of all tire guarantees is strongly recommended. We believe that the majority of tire companies hope for the time when the truck tire mileage guarantee can be dispensed with, as well as the pneumatic tire mileage guarantee.

Would it not be possible to change your otherwise most excellent cost keeping system in such a manner that the manufacturers' guaranteed mileage, and whether a certain manufacturer makes a mileage guarantee or not, would not affect the method of keeping truck operating costs?—HAROLD W. SLAUSON, Engineering Service Manager, Kelly-Springfield Tire Co., New York City.

We agree with you that the guaranteed mileage is a poor basis for estimating tire costs; firstly, because it by no means represents the life of a tire even in the majority of cases and, secondly, because tire guarantee has ceased to be anything like universal. However, where such a guarantee exists it is at least better than no basis for estimating depreciation. You will understand that in a general article of the sort published in the Sept. 15 issue directed to fleet owners operating trucks in all fields and under all conditions it is impossible to give any accurate basis.

In THE COMMERCIAL VEHICLE Standard Cost Keeping System the item for tire depreciation which is the first item under maintenance charges, makes no reference to the guaranteed mileage as a basis. It simply reads, tires, so many miles, at so much per mile. Therefore, it is adaptable to any tire life basis which the operator chooses to use. The life of a truck tire will vary widely according to the size of truck, the goods handled, the length of run, the type of road and traffic condition, to say nothing of the question of whether the tire is a pneumatic or solid or expensive or cheap. Therefore, it is impossible even to approximate a mileage life which could be employed by all truck operators. But it seems to us that the individual operator can himself work out a good mile-

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

age life basis after he has worn out at least one and preferably two sets of tires basing it on the mileage covered by those tires. This would seem to get around the difficulty of suggesting a mileage basis for operators in different fields. It does not of course help the man operating a truck for the first time but the tire item is not so important as to make it essential to estimate the mileage cost of the first set of tires very accurately.

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

### Carbureter Leaks in Cold Weather

To the Editor, COMMERCIAL VEHICLE:

Why is it that in cold weather carbureters will leak whereas when it is warm they will not?—C. S. WELLS, New York City.

It is possible that the leakage is caused by the float level being too high or perhaps a sticking float. When the weather is cold there is always more or less condensation in the manifold and it is possible that enough raw gasoline collects in the manifold to drain back and cause leakage. Many drivers open the throttle when shutting the engine down and in cold weather this would have a tendency to cause flooding.

### Reader Wants Information on Mack Electrical System

To the Editor, COMMERCIAL VEHICLE:

What should be done to run without the battery on Mack trucks without doing any harm to the generator?—READER.

If the generator is run without the storage battery connected in the circuit the generator terminals should be tied together with a short piece of copper wire to short circuit the machine.

## Badly Worn Valves May Be Cause of Loping Engine

To the Editor, COMMERCIAL VEHICLE:

My engine lopes when idling. It runs fine in high up to 12 m.p.h., then starts to lope. The carbureter has been tried with every conceivable mixture, all having the same effect. However, the engine acts worse when a rich mixture is used. Can you advise what causes it to lope and how to remedy?—J. KELLY, Boston.

This loping condition is probably due to a faulty vacuum tank or badly worn valves. Indications are that raw gasoline is being drawn into the manifold which causes loading and consequently irregular running of the engine. A good test to make is to remove the inner vacuum tank, leaving only the outer shell. Fill the shell with gasoline and if the engine does not run correctly the fault lies somewhere else besides the vacuum system. If the trouble lies in the vacuum tank it may be caused by a leaky float or perhaps the flapper valve is out of commission.

A leaky float will cause the vacuum valve to remain closed and raw gasoline will be drawn into the manifold. A small particle of dirt getting under the flapper valve might prevent its seating tightly and render the tank inoperative. Sometimes the trouble can be overcome by simply tapping the tank. One way of determining whether the flapper valve is seating correctly is to plug up the air vent and detach the tubing from the bottom of the tank. Start the engine and apply the finger to the opening. If suction is felt continuously, there is a leak in the connection between the tank and the main gasoline supply or the flapper valve is being held off its seat.

It would be advisable to check the manifold connections to see that they are tight. Examine the valve stems. Very often badly worn valve stems will permit air to enter and cause irregular running and it will be impossible to get smooth operation with any carbureter adjustment.

## Clears Up Misleading News Item on Acetylene Lamp Legality

To the Editor, COMMERCIAL VEHICLE:

In your Aug. 15, 1921, issue, page 38, I find an item entitled "Acetylene Lamps Legal in Massachusetts," which reads in part:

"Registrar Frank A. Goodwin has finally approved acetylene gas headlights for use on such trucks, cars and motorcycles as use them at present."



This is misleading. Acetylene headlights are not only permitted on all classes of motor vehicles which use them "at present," but are permitted on new equipment as well. The ruling permits the use of acetylene headlights when equipped with a 6-in. mirror,  $\frac{5}{8}$ -ft. burner and clear glass front. The measurement of the mirror follows the contour of the reflecting surface and does not mean the diameter of the mirror. The diameter may measure between  $5\frac{1}{2}$  and  $5\frac{3}{4}$  in.

Inasmuch as your publication is undoubtedly read by truck manufacturers, I feel that the real facts of the Massachusetts headlight situation should be told. Your story certainly would give the manufacturer the impression that he cannot equip new vehicles with Prest-O-Lite gas.—O. F. OSTHY, Prest-O-Lite Co., New York City.

### Best Way to Remove Ford Wrist Pin Bushings

To the Editor, COMMERCIAL VEHICLE:

What is the best method of removing bushings from Ford pistons and putting in new ones? Please mention several ways. Is it usually necessary to rub down the new bushings before pressing them in?—W. CROSBY, New York City.

The best method of removing the bushings is with the use of an arbor press and a special fitting which can be purchased from a Ford dealer. Care should be exercised that the piston is not distorted. Driving the bushings out with a hammer invariably results in knocking the piston out of round. The driver should be slightly smaller in diameter than the hole through the pistons and should be finished with a short stub slightly smaller than the hole in the bushing. This serves to line it up with the bushing and prevents side binding. One bushing is removed through the inside of the piston, which is then turned over and the other forced out in the same manner.

When pressing in the new bushings, it is important to have them line up properly with the piston holes as a cocked-over bushing requires considerably more pressure to force in and may cause the piston to be pressed out of round. The bushing should be pressed in until it is about  $1/16$  in. exposed on the inside of the piston, or until it is  $1/32$  in. inside the outside diameter of the piston. When the bushings are in place they should be reamed to size with a standard Ford pilot type reamer.

There are no several ways of doing the job right. As mentioned before, the hammer must not be resorted to at all unless the mechanic is willing to run the chances of springing the piston.

Another method which works fairly well is to provide a heavy washer somewhat smaller than the piston hole, a  $\frac{1}{4}$ -in. bolt  $4\frac{1}{2}$  in. long, threaded for about  $\frac{1}{2}$  in. of its length, a nut for the foregoing and a piece of heavy flat stock drilled with a  $\frac{3}{8}$ -in. hole. To use, the washer is placed over one of the bushings, the bolt passed through it, the two bushings and the hole in the piece of flat stock, and

the nut applied to the bolt and drawn down. This will, of course, pull the bushing to the inside of the cylinder. The process is then repeated with the other. The pistons may be held by the ends in a vise protected by two pieces of soft wood. As little pressure as possible should be used.

It should not be necessary to dress the bushings down on the outside. If they are started into the holes straight they will press in without great difficulty, although .001 or .002 in. may be shaved from them in the process. After they are pressed home they should be reamed as mentioned in a previous paragraph.

### Engine Runs Well in Low Gear But Misses in High

To the Editor, COMMERCIAL VEHICLE:

When an engine runs perfectly and pulls very well with the truck running in first speed, but misses badly or dies when running in high gear, what does it indicate? If the engine idles well but misses or dies as soon as it is placed under load, what does it indicate?—READER.

In the first place we shall assume that you refer to a condition where the engine is running at low speed and under load. In order to determine the location of the trouble it will be necessary to apply a process of elimination. Very often an engine will pull well at low speed and give pretty good acceleration, but when running along at higher speeds in high gear it will miss badly and sometimes die.

Examine the valves and check the valve timing. Next, check the ignition system carefully and see that it is properly timed. Missing under the conditions mentioned might be due to faulty ignition. Check the gap of the spark plug electrodes and see that it is set to about .025 in. Look over the distributor contacts and if battery ignition is used, test the storage battery. If magneto ignition is used missing at high speeds may be due to weak magnets or trouble at the platinum points. Check all connections of the manifold and the carbureter. If found tight proceed to make a careful check of the carbureter. Clean the carbureter and fuel line and then adjust the carbureter. If missing still occurs check the float level, as this may be the seat of the trouble.

Missing when the engine is placed under load may be logically attributed to carbureter trouble. Very often clogging of the fuel line will not permit enough fuel to get into the carbureter to insure perfect operation of the engine. It is also advisable to check the valve timing. If the engine is timed very late it may give the action described but it is very probable that quite noticeable explosions will occur in the muffler.

### Testing for Weak Valve Spring Solves Problem

To the Editor, COMMERCIAL VEHICLE:

The push rods on a model 17 Ford stick and thus hold the valves open. Putting gasoline around the push rod and guider to cut the dirt does not seem to help.

What would you advise doing?—H. SMITH, Pittsburgh, Pa.

If the valves do not seat properly it may be logically attributed to weak or broken valve springs. Weak inlet valve springs will not produce a noticeable effect upon the running of the engine but weak exhaust valve springs will cause uneven running. This is due to the fact that the exhaust valves do not close immediately, which allows a certain portion of the charge under compression to escape thus reducing the force of the explosion.

A good way to test for weak springs is to remove the valve plate and insert a screwdriver between the coils of the spring with the engine running. If the speed picks up it indicates a weak spring. The only remedy in this case is to install new valve springs. There is also a possibility that warped valve stems contribute to the trouble. However, if the valves are in good condition they can easily be trued. If you will examine the valve and valve seat you will probably find both pitted and coated with carbon. This can be remedied by grinding in the valves. If carbon causes frequent trouble indications are that the pistons are pumping oil. This being the case, the only remedy is to have the cylinder block reground or rebored and over-size pistons and rings fitted.

### Your Midwest Engine

(Continued from page 17)

for the first season, as on a new engine there is always a tendency for the metal of valves and seats to compress under the constant hammering of daily use to a hardened glazed surface which will need "truing up."

When governors are applied to these engines, they should be set to secure wide open throttle at whatever speed the engine is to deliver its maximum power, and allowed to idle at whatever speed above that point they will "cut off." In other words, if engine full load is to be at 1000 r.p.m. then the governor should be set to get maximum power at 1000 r.p.m. and to idle where it will, above that speed. All governors permit higher idling speeds than when under full load, and it is not advisable to govern too close to rated speed, as the power output of the engine will be curtailed materially when so set.

All flywheels are marked to indicate when pistons are at top and bottom dead center and also when intake and exhaust valves open and close. A small opening in the top of the flywheel housing (upper half) is covered by a plate which, when removed, will allow these markings to be seen.

It is important to inspect and adjust breaker contacts in magneto and spark plug points when overhauling the engine. The magneto breaker gap and spark plug gap must be taken within the limits prescribed by the manufacturer or engine performance will be adversely affected. In general a breaker gap of  $1/64$  in. and a spark plug gap of a scant  $1/32$  in. (about .025 in. to .030 in.) will be found to give fair results.





## Trucks and the Railroads

**H**ANDLING less than carload freight on short hauls is an expensive operation for the railroads. It is so expensive that many of the railroads, far from wishing to hold on to it, would be glad to get rid of it, judging by such views as have been expressed on the subject. This has opened up a big and growing field for the use of the motor truck.

The president of one railroad expressed himself as follows: "It seems to me that the automobile truck as a transportation factor has a field where it can be useful in the handling of miscellaneous short-haul traffic in and near congested centers, and no doubt the present situation will afford a favorable opportunity for the development of the motor truck in the field where it can be most useful under normal conditions. Fortunately, the condition under which the motor truck can be operated to the best advantage is in handling the traffic which is most expensive to the railroads to handle."

Along the same line the consulting engineer of a large truck manufacturer has said: "It is in the short haul and at terminal points that the railroads are at the greatest disadvantage, both as to service rendered and to their own earnings. And it is here that motor transportation comes as a help and releases cars for the long hauls, where they are most efficient. The railroads have not always considered the motor truck as an ally, but the two co-operate far more than they compete and the railroad is at one end or the other, of most truck hauls."

This engineer quoted the following figures to show the difference in the cost of transportation on short hauls by railroad and by trucks:

To New York from	Miles	100 lb. cost by rail	100 lb. truck rate	Hours saved by truck
New Rochelle	17	\$1.03	\$0.25	21
Stamford, Conn.	34	1.10	0.60	19½
Bridgeport, Conn.	57	1.20	0.75	41
New Haven, Conn.	74	1.23	0.80	39½
Hartford, Conn.	109	1.28	1.10	108
New London, Conn.	127	1.36	1.30	106
Springfield, Mass.	150	1.28	1.50	152
Providence, R. I.	185	1.41	1.90	76
Gloucester, Mass.	201	1.54	2.00	147
Fall River, Mass.	220	1.41	2.20	97
Boston, Mass.	233	1.41	2.40	71
Lowell, Mass.	259	1.46	2.60	141

In these figures the total costs by rail per 100 lb. equals freight rate plus teaming charges both ends

(\$1.30) plus cost of extra boxing (\$.24) plus extra freight charge on increased weight of boxing (17 per cent of freight rate).

The truck costs are the Trucking Association figures for 1920. Hours saved by trucks are estimated to include loading and unloading time of 1 hour and running time at 10 miles per hour.

These figures show that, in addition to the great saving in time made by the motor truck, it is actually cheaper to ship by truck than by freight within a radius of 127 miles. Beyond 127 miles, truck transportation costs more, per 100 lb., than freight. But where time is a factor, it may pay to send l. c. l. shipments by truck to points within a radius of 250 miles, or farther, dependent upon the time factor.

These figures alone show that there is a great field for the motor truck in industrial America. To some extent this field has been recognized and cultivated by shippers small and large. That it has not been more cultivated is due to two causes.

One of these is the fact that many of the men in the business of inter-city haulage by motor truck, operating on a shoe-string, have succeeded in getting the hauling work for one or two local concerns and are satisfied to let it go at that.

The other cause is perhaps the fact that inter-city haulers have been too prone in the past to play up the time element in advertising and recommending their service. The fact that they have placed so much emphasis on the time element has not only caused some shippers to disregard the fact that in most instances shipping by truck is actually cheaper, but has also, in certain cases, led those shippers to believe, without extensive investigation, that they must pay more for the quicker service. If this business is to be built up, the shippers must realize that the truck service is cheaper as well.

This can only be accomplished by advertising, in one form or another. And before advertising is possible the business must be placed on a sound basis. The day of the extensive inter-city haulage company is coming. In many cases it has arrived. The railroads are ready to recognize the truck as an ally rather than a competitor. The only thing that remains for the inter-city hauler is to build up a business which is as efficient in its methods as the railroads and then teach the shipper the truth.



## Urge Better Packing of Shipments

### November Selected as Perfect Package Month to Stimulate Public Interest

NEW YORK CITY, Oct. 7.—All trades and industries have been asked to co-operate in the "Perfect Package Movement" to be inaugurated by the railroads, steamship lines and express companies in the United States and Canada, in November, which has been designated as "Perfect Package Month."

The purpose of the movement is to stimulate further public interest in good packing of shipments and to enable the carriers to improve the transportation service of the country. During November, an examination of all shipments sent by freight or express, will be conducted, to obtain information as to the best shipping methods carried on by the various trades and industries.

In every city and town, the railroad and express people will form campaign committees, to co-operate with local shippers' associations, in carrying out the plans announced for "Perfect Package Month." "Exception Reports" will be made out for all faulty shipments discovered and these reports will be sent to the shippers' association for tabulation, to ascertain how high a percentage for "Perfect Packages," the shippers of that city have attained.

Comparisons of the records made by the various cities during November will be announced at the conclusion of the drive. The entire working forces of the railroad and express carriers, comprising some 2,000,000 men, will aid in the movement. The railroads, through the American Railway Assn., composed of practically all of the railroads in the country, are pushing the campaign, as a means of raising the standard of the service, while the express agents are also getting ready to interest shippers in the undertaking.

### Price Changes

NEW YORK CITY, Oct. 3.—Prest-O-Lite Battery Co., has announced new prices. The new price is \$23.50. The price was \$31.15.

ATLANTA, GA., Oct. 4.—A 50 per cent reduction has been announced on all models of White Hickory motor trucks, manufactured in Atlanta by the White Hickory Wagon Mfg. Co. This truck is extensively used in the Southeast. Following is the new scale of prices:

1 ton.....	Reduced from \$2,400 to \$1,200
1½ ton.....	Reduced from 2,750 to 1,375
2½ ton.....	Reduced from 3,350 to 1,675
(17½ in. wheel base)	
3½ ton.....	Reduced from 3,450 to 1,725
(165 in. wheel base)	

LIMA, OHIO, Oct. 3.—The Gramm-Bernstein Motor Truck Co. has reduced the price of its Model 10 speed truck from \$1,495, to \$1,365.

## 10,614 FEWER HORSES IN NEW YORK CITY

NEW YORK CITY, Oct. 10.—Registered stallions in Wisconsin decreased from 2437 in 1918 to 1688 in 1920. In the State of Michigan they decreased from 1288 in 1918 to 1068 in 1919. Ohio had 965,000 horses in 1917 and 862,000 in 1919. It is hardly surprising, therefore, to discover that the New York City Board of Health's horse census, which will be released shortly, will show that there are today in New York City approximately 10,614 fewer horses and 1784 fewer stables than in 1919.

## Trucks Cause Coal Price Reduction in Reading

READING, PA., Oct. 8.—A reduction in the price of anthracite, ranging from 60 cents to \$1.05 a ton on the various sizes, has been made by dealers here to meet the competition of motor truck owners now hauling coal from Schuylkill County mines to this city, where they sell it at retail.

The buying of coal at the mines and hauling it here to be resold, by motor truck, has become a flourishing industry, so much so as to alarm the established coal dealers. In the meantime the consumer is profiting.

It is expected that many other dealers will meet the reduction caused by the truck hauls, especially in view of the dullness in trade that prevails at present. But even at the cut prices, the volume of business is not up to normal.

## American Express Mechanics Organize

PHILADELPHIA, Oct. 3.—Mechanics in the shops of the American Railway Express Co. in this city have been organized by District 1, International Association of Machinists. Similar success in the unionizing of these mechanics is reported from all sections of the country. The movement is the general campaign of the International Association of Machinists with headquarters in Washington, to bring into the union fold all mechanics engaged in the motor truck and passenger car industry.

## Insurance Policies Reduced 50 Per Cent

NEW YORK CITY, Oct. 3.—A general reduction in the size of automobile insurance policies in most cases amounting to 50 per cent, was announced at the annual conference of the National Automobile Underwriters, held at the Commodore Hotel here recently. It was explained that while policies issued last year would be continued, underwriters throughout the country were more cautious in renewing or issuing policies.

## Buses Carry Billion London Passengers

### 2700 in Operation—Jackson Believes Buses Will Supplant Street Cars

NEW YORK CITY, Oct. 10.—Walter Jackson, consulting engineer and at one time an editor of the *Electric Railway Journal*, in an address to the truck manufacturers of the National Automobile Chamber of Commerce last week, stated that in his investigations of the bus situation in London he found that 2700 buses were carrying a billion passengers annually.

He also stated that the bus can be used profitably instead of street car extensions into residential districts and can be substituted profitably where retrackage becomes necessary. Mr. Jackson believes that they will eventually supplant traction systems because of the pyramiding costs of electric railways.

## Rail Fares Reduced to Regain Traffic Lost to Buses

LOUISVILLE, KY., Oct. 10.—In an effort to regain some of the traffic between New Albany and Corydon, Ind., taken from it by motor bus lines, the Southern Railway Co. is advertising a reduction of 75 cents in the round trip price of its tickets. The line is 7 miles long and is the only railroad entering Corydon, a town of 2000 population.

## Blame Put on Speeding

WASHINGTON, Oct. 4.—Analysis of statistics compiled by the Maryland State Roads Commission dispels a popular belief that most automobile accidents occur on the sharp curves, grade crossings and steep grades. It has been found that the vast majority are caused by the recklessness of motorists, and 90 per cent are due to speeding. Maryland authorities discovered that the largest number have occurred at the places that have always been considered safe, while the sections of roads which have been commonly regarded as extremely dangerous are proving to be relatively free from accidents.

## South Bend Bus Controversy

INDIANAPOLIS, IND., Oct. 6.—More trouble in Indiana between buses and interurban and electric companies was reported to-day from South Bend, Ind., where Ralph Smith, general manager for the Chicago, South Bend and Northern Indiana Railway Co., appeared before the City Council asking that steps be taken to curtail operation of bus lines between South Bend and Elkhart and South Bend and Niles, Mich. Smith declares the company will be forced into bankruptcy or increased rates will be put into effect if competition by bus lines continues.



## Buses Bonded Heavily in Portland

### Stage Operators Must Furnish \$10,000 for Each Vehicle—No Opposition

PORTLAND, ORE., Oct. 1.—All stage operators who run buses in Portland and from Portland to points outside must have each stage bonded for the sum of \$10,000, according to an ordinance which was introduced in the Portland city council this week. The ordinance was drafted at the request of City Commissioner Mann, who has charge of public works, and is considered certain of passage.

At the present time the city ordinance requires a blanket bond of \$1,000 for each operator; but this is considered far too small to cover the larger buses which are now operating from Portland in nearly all directions for as great distances as 100 miles. Some of these buses carry as high as fifteen or twenty passengers. The bus proprietors are declared not in opposition to the ordinance, and several of the companies already have bonded their vehicles at the new rate, although the ordinance has not yet passed.

During a discussion of the ordinance this week by the city council a sharp tilt occurred between city officials and representatives of the Auto Transit Co., one of the state operating companies, in which it was declared by one of the city officials that the Auto Transit Co. was endeavoring to get a monopoly of the stage business in Portland by controlling stands and routes and letting the same out to bus operators. Although this was vigorously denied by company representatives, the charge brought the statement from Acting Mayor Bigelow that all steps possible would be taken to prevent any monopoly of the stage business being secured. Construction of a motor stage depot covering a quarter of a block in the heart of the business section will start next month and the depot will be ready for occupancy by the first of the year. The depot will be similar to railroad stations in many ways, with a drive in for cars, and with ticket windows, announcers and all the other conveniences. A co-operative association has been formed by the bus operators for the purpose of erecting the depot, which will cost \$40,000, and over 90 per cent of the operating companies are now in the co-operative association. It is estimated that when the new depot is in operation a stage will leave the station bound for some point outside the city of Portland on the average of one every 5 minutes during the working hours.

### Truck Headquarters Closed in Chicago

CHICAGO, Oct. 3.—At a meeting of the board of directors of the Motor Truck Manufacturers Association held here, it was decided to close the associa-

## ROADS BUILT IN 200 B.C. STILL GOOD

BERKELEY, CAL., Oct. 8.—The roads of ancient Rome, built in 200 B. C., are in better condition than many of the highways of California to-day, according to Professor Max Radin, of the University of California. Says he:

"The Appian Way, built more than 200 years before the Christian era, is today one of the finest roads in all Italy. Automobiles may use it safely, and, though it is narrow, it is in excellent condition. The explanation is that the Roman roads were not built to support traffic during the term of one Roman consul, but for all time."

tion office and dispense with the services of the manager and staff. At the suggestion of B. A. Gramm, vice-president of the Gramm-Bernstein Motor Truck Co., an association member, it was decided to continue the activities of the organization through the medium of occasional meetings of such members as may remain in the association.

The association was organized in April, 1918, for the purpose of ready exchange of parts among manufacturers under contract with the government to build army type B trucks. Later the activities of the organization were broadened to cover such points as legislation and general expansion of the industry. The association started with fourteen members. This number was raised to fifty-five but dropped to thirty-one. David Thomas has been manager since the organization.

### Columbus Bus Ordinance Discarded

COLUMBUS, OHIO, Oct. 8.—The ordinance introduced in the city council for the regulation of motor buses on the streets of the Buckeye capital was torn into shreds by a special committee and the backers of the ordinance have decided to introduce an entirely new measure. The principal features of the new ordinance are a license fee of \$500 for each line; each bus to carry liability insurance to the amount of \$25,000; applications for licenses to be made to the city clerk who in turn refers them to the City Council for final action. It is planned to have council pass on these licenses in about the same manner as on franchises for public utilities.

The ordinance will not apply to bus lines operated from Columbus to cities and towns outside. Regulation of those lines will come in another ordinance. Nothing is said about fares, but this will be considered when the application for licenses are filed.

No steps will be taken to forbid buses from using the principal streets as was suggested in the first ordinance.

## Poor Trolley Service Helps Buses

### Decision Permits Bus Competition—Traction Company Makes No Improvements

AURORA, ILL., Oct. 9.—A long drawn out battle between the Smith Bus Line of Aurora and the electric railroad known as the Aurora, Elgin & Chicago, was won by the former when the Illinois Commerce Commission granted a certificate of convenience and necessity, holding that the service of the traction line was inadequate and that the motor bus service was necessary to take care of the transportation needs of the public.

The bus company is required to put up a bond of \$10,000 for each vehicle operated to protect patrons in the event of accidents. The company has agreed to do this and will operate seven buses between Aurora and Joliet via Batavia. The commission, in reviewing the case, asserts that the traction company declined to make a ½-mile extension which would have taken care of the needs of a large number of persons. Crowded cars and inability to take care of the traffic offered, are also cited as additional reasons for permitting the bus lines to enter into competition with the electric line. Mark Smith of Aurora is president of the bus line.

### Rockford Bus Fight Continues

ROCKFORD, ILL., Oct. 8.—The fight for supremacy between the street railway line and the Thomas Fay Motor Bus Co. is still in progress. The City Council, after voting down a proposition to give the buses authority to cover the entire city, voted to reconsider the subject with a view of making some modifications. President Fay claims that his 5-cent fare will save the people of Rockford \$175,000 per annum, while he promises to provide service for many important districts not reached by the street car lines.

Fay reports his receipts during 1920 to be \$193,492, while up to the first of October of the present year, his buses earned in excess of \$150,000. Fay claims that he figures a profit on the Loves Park Line, a 6-mile haul, at 10 cents per patron, and he is confident that he can also show a profit upon all the city lines at 5 cents.

### "Jitney" in Bad Repute

NEW YORK CITY, Oct. 10.—The motor truck manufacturers of the country propose to take the "jit" out of jitney. In fact, they are opposed to the use of the word at all and will use all the influence they have to bring about the substitution of motor bus or just plain bus. They believe "jitney" has come into bad repute and the public generally misunderstands the term. A good many people who would be glad to ride in a motor bus shun the jitney in the belief that it is likely to be a converted ice-wagon.



## S. A. E. Completes Tire Size Report

### Recommend Elimination of 3 Straight Sizes and Want Other Changes

NEW YORK CITY, Oct. 3.—The special committee on tire and rim standardization of the Society of Automotive Engineers appointed last December to consider the standardization of tires and rims, has completed its report relating to policy so far as co-operation of the society with the National Automobile Chamber of Commerce and the Rubber Association of America is concerned, and will present its recommendations at the January meeting of the standards committee of the society. The recommendations will then be presented to the society as a whole for action. They have already been approved by the rubber association.

If this report is adopted by the society, it will be entered in the official handbook as "S. A. E. Best Recommended Practice," instead of "S. A. E. Standard," as is now the case, the change being due to the alterations in the existing table.

Three present sizes would be eliminated, 32 by 3½, 33 by 4, 33 by 4½ straight side with the addition of a 30 by 3½ clincher and 30 by 3½ straight side type, with a 31 by 4 oversize and no regular. The sizes to be recommended as the best practice are as follows:

Rim Size	Regular Size	Oversize
30 x 3½ C	30 x 3½	31 x 4
30 x 3½ SS		31 x 4
32 x 4	32 x 4	33 x 4½
32 x 4½	32 x 4½	33 x 5
34 x 4½	34 x 4½	35 x 5
34 x 5	34 x 5	36 x 6
36 x 6	36 x 6	38 x 7
38 x 7	38 x 7	40 x 8
40 x 8	40 x 8	42 x 9
44 x 10	44 x 10	.....

A subcommittee of the executive committee of the tire manufacturers division of the Rubber Association is still engaged in working out general recommendations for tire manufacturers on the subject of mileage guarantees and the protection of prices. When the deliberations of the committee are completed, it is hoped there will be a greater uniformity of practice. The mileage question is one of the most annoying which confronts the tire industry, and it is felt that inasmuch as all standard tires exceed the guarantee in this respect, with proper usage, some definite reform is possible. Consideration of these subjects will be continued and final reports are hoped for within a comparatively short time.

### Wide Scope of S. A. E. Research Department

NEW YORK CITY, Oct. 10.—President Beecroft of the Society of Automotive Engineers, has expressed the view that within less than ten years the Research

## TRUCKS BIG FACTOR IN DAIRY HAULAGE

SEATTLE, WASH., Oct. 3.—Tacoma and Pierce County, Wash., rank among the leading places of the country in the number of motor trucks used in the dairy business. Recent analysis of the situation shows that the percentage of trucks used in Tacoma and other Northwest cities to be higher than in any other section of the country. This is due in great measure to the high state of perfection of roads in Washington, making it an economy to use trucks in milk delivery.

Dairymen believe that trucks have materially reduced their delivery costs over the old method of horse and wagon. Delivery is almost continuous and two trucks can cover the same territory which formerly necessitated the use of many wagons.

Department which the Society has established recently will be of as great magnitude and value to the automotive industry and the country as the S. A. E. Standards Department, which is just entering its second decade.

Dr. H. C. Dickinson, the manager of the research department, in a recent address before the Detroit Section of the Society, outlined the purposes, aims and possibilities of the department. He said that, in general, the testing of any individual device or any particular material is not included in the definition of research. On the other hand, the study of methods of test as well as the deduction of general information from a systematic series of tests is properly so classed, although to be of value as research the results must be put in such form that they can be of general information.

### May Close Cotta Plant

ROCKFORD, ILL., Oct. 3.—Although receivers of the Cotta Transmission Co. have operated the plant in the last few months to show a net profit of \$5,139.14, the referee in bankruptcy next week will be asked to approve the recommendation of the creditors that the plant be closed and bids asked for the remaining assets. The factory, under the court order, will operate until sanction is given the closing plan.

Receivers' statements show orders on hand Sept. 17 amounting to \$2,308.50, with liabilities of \$250 and cash balance of \$45,162.20.

Alternative proposals made at a recent conference of the receivers and the creditors were operation of the plant pending disposal upon bids for its remaining assets or continued operation without definite future program. Court approval would have been required, however, as the receivers' orders were to continue operation of the plant until the court ordered otherwise.

## Trucks Save Largest Peach Crop

### Connecticut Farmers Reach Distant Markets Formerly Reached by Rail

MANCHESTER, CONN., Oct. 3.—Farmers in this state are completely sold on motor truck transportation. The economy of truck transportation was manifested especially this year during the movement of the largest peach crop in the history of the state.

Motor trucks at that time helped to prevent a flood of native produce as well as peaches from becoming a total loss to the farmers. In regard to the peach crop which amounted to over 1,000,000 baskets of fruit, it was readily understood that the local markets could absorb but a small fraction of this great harvest and that delay and high rates militated against the extensive use of the railroads as agencies for marketing.

But the motor truck came to the rescue of the farmer in fine fashion. At least fifty trucks were loaded daily with peaches and tomatoes for the next morning's early markets in New York and Boston. Speedy truck deliveries brought the produce with the bloom still on direct to the consumer, or, at any rate, to the retailer.

Fast freight trains, of course, handled many carloads of Connecticut fruit, but, without the supplementary aid of the truck, it is safe to say the fruit grower would not have been as well fixed this year.

### Hare's Relations With Kelly-Springfield to Continue

NEW YORK, Oct. 3.—Although Emlin S. Hare has resigned as president of the Kelly-Springfield Motor Truck Co., and the other representatives of Hare's Motors who were officers of the truck company have resigned, it is said that the two corporations have renewed their relations in the sales field and that Hare's Motors will continue to offer a complete line of trucks ranging from 1½ tons to 6 tons capacity, with a wide selection of wheelbases, frame lengths and gear ratios. Charles Willard Young of Emerson McMillin Co. has been elected president of the truck company to succeed Hare.

### Clark-Turner Piston Factory Branches Established

LOS ANGELES, CAL., Oct. 3.—The Clark-Turner Piston Co., this city, maker of the Deluxe light weight gray iron pistons, has established factory branches in Kansas City, Freeport, Ill., and New York City. Arrangements have been made in each case with well-known firms to act as special distributors who will handle warehouse stocks that will permit any part or section of the United States to be served in 24 hrs. or less on any size or oversize of pistons desired.



## Urges Uniform Laws to Aid Traffic

### Ordinances Should Be Strictly Enforced, Says Fenner, to Curb Truck Hazards

BOSTON, Oct. 8.—Motor truck transportation can be made far more safe by the adoption of uniform scientific traffic laws in all the States, and by stricter enforcement of the statutes, in the opinion of D. C. Fenner, chairman of the Motor Vehicle Conference Committee and manager of the Public Works Department of the International Motor Co., speaking before the New England conference of State highway commissioners and motor vehicle registrars. The conference was held in connection with the annual congress of the National Safety Council.

Fenner stated that careful analysis discloses that accidents in which motor trucks have figured have usually arisen from excessive size, weight or speed of the vehicles; from overloading or from inadequate or defective equipment. Still other causes were reckless or incompetent operators, improper enforcement of the laws and conflicting traffic regulations as between States or the municipalities within the States.

He recommended support of the movement which has been begun to bring about the general enactment and enforcement of uniform motor vehicle laws throughout the entire United States and in this connection explained those provisions of the proposed law which have a vital bearing on those factors, and showed how the adoption of the measures recommended would make for safety.

### Three New Commerce Models

DETROIT, Oct. 8.—The Commerce Motor Car Co. has three new models coming through, a bus body for the Model T chassis, a Model 18 chassis with longer loading space and 5000-lb. payload capacity, and a "Store-At-Your-Home" truck, which is in fact a body carrying a small grocery store stock in bins. The bus body, capable of carrying thirteen passengers, with equipment of 34 x 4½ in. cords sells for \$2,300, including the Model T chassis. The new Model 18 sells for \$2,150 in chassis, and the "Store-At-Your-Home" model for \$2,250. A refrigerator may be added for \$90 additional.

### Retains Philadelphia Service

PHILADELPHIA, Oct. 8.—Following a conference of the interested parties, announcements have been made regarding the plans of the new executives of the Locomobile Co. of America for continued operation of the various plants.

The Philadelphia interests of the company will be carried on, as for the last 17 years, by the Philadelphia branch. With a view toward the strictest oper-

## STATE BULLETINS HELP RECOVER CARS

ROCK ISLAND, ILL., Oct. 11.—Weekly bulletins to aid in recovery of stolen cars and trucks are being issued by the Secretary of State's office in compliance with provisions of the new motor legislation.

The bulletin gives the name of the vehicle, its model, serial number, engine number, State license and style of body. Notation of peculiarities of the vehicle, special equipment, tires, marks, defects or other distinguishing features is included.

The service is now fully established, listing 75 cars in the last report, and several stolen cars have been recovered through this bulletin. Upon location of a stolen car, the local authorities notify the Secretary of State, who in turn advises police authorities in the town from which the car was taken.

ating economy, the building which the branch has occupied for years has been vacated and a permanent location for the service department has been established.

### Kansas City Chosen for Kaw Truck Plant

KANSAS CITY, Oct. 8.—The Kaw Motor Truck Co. is one of the newest motor truck manufacturing concerns to locate in Kansas City. The new concern will manufacture the Kaw motor truck in the 2½, 3½ and 5-ton sizes. Fred Jones, formerly with a large Chicago truck building concern, is the designer of the truck which is being built to meet peculiar road conditions in this section. Nelson Prentice, formerly with the Diamond T Truck Co. of Chicago, is president of the company. H. W. Metcalf, vice-president, and J. W. Laster, treasurer and sales manager, have both been identified with the local automobile field.

## Coming Events

1921

- Oct. 8-23, Dallas, Tex., Truck Show, Annual State Fair of Texas and International Exposition, Dallas Automotive Dealers' Assn., Auto Bldg.
- Oct. 18-21, Raleigh, N. C., Truck Show, Sixtieth Annual State Fair at Fair Grounds.
- Oct. 24-29, Oakland, Cal., Annual Convention International Trade Outlets Assn., Municipal Auditorium.
- Nov. 14-19, Jersey City, N. J., Truck Show, Fourth Regiment Armory.
- Jan. 19-25, 1922, Milwaukee, Wis., Truck Show, Auditorium.
- Feb. 6-9, Scranton, Pa., Truck Show, Armory.
- Feb. 12, Madison, Wis., Truck Show, Cartwell Bldg.

## Black & Decker Time Payment Plan

### Permits Purchases on a 23 Per Cent Basis, Balance in Monthly Installments

BALTIMORE, Oct. 3.—An arrangement to sell its product on a time payment basis has been made by the Black & Decker Mfg. Co. The plan, which was put into operation Oct. 1, permits dealers, garagemen and other users of the company's products to buy them on the basis of 23 per cent down and the balance in monthly installments for a six months' period, without interest charges.

The plan, which is called the Black & Decker National Credit Service, was adopted to assist dealers and garagemen to obtain at once machinery which the company produces instead of having to wait, as has often been the case during the credit stringency, until funds could be accumulated for the purpose.

The company believes that the plan will enable the fleet owner to put in labor-saving equipment so that he can take care of his work with less help, saving on his payroll, or enabling him to obtain and take care of more work with the same payroll. Not only will the service benefit the user but it will be an assistance to the jobber because he will be able to avoid the necessity of carrying the purchaser's account thirty or sixty days, as is customary, and also will be relieved of the cost of collections, which will be handled by the banking company.

Operation of the plan is outlined as follows:

"We furnish to our jobbers a supply of forms for their salesmen. These forms are a combined order and conditional sale agreement. The jobber distributes the forms to his salesmen who use them very much the same as they would any other order form, securing the buyer's signature and turning the order in to the jobber who accepts it, makes delivery of the goods from his stock and forwards the order to us. We in turn immediately send the jobber a check for the proper amount, or if the jobber has an outstanding account with us we will credit him on our books.

"We, in turn, discount these agreements through our commercial finance company and they make the collections.

"While this has only just been put into effect, the results are startling, and it is apparent that so far as our business is concerned this is what was needed to help jobbers and users."

### New Armleder Service Stations

BALTIMORE, Md., Oct. 5.—The O. Armleder Co., Cincinnati, maker of Armleder trucks, has established service facilities in Baltimore, Md., at 2601 Pennsylvania Avenue; in Charleston, W. Va., under the guidance of the J. M. Hunt Truck and Tractor Co.; Paducah, Ky., under the guidance of the Union Motor Car Co.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. O. Building  
239 West 39th Street, New York

## CONTENTS

Vol. XXV. No. 7

November 1, 1921

### LEADING ARTICLES

Selling the Bus to the Passengers.....	8
The Need for Real Driver Credentials.....	10

### MISCELLANEOUS ARTICLES

Is Store Door Delivery Coming?.....	12
Trucks in the Oil Fields.....	14
If Your Truck Costs Seem High.....	16
How California Regulates Truck Traffic.....	18
Do You Need This Support? .....	19

### DEPARTMENTS

The Better Way.....	20
Buyer's Department:	
New ¾-Ton Stewart Has Larger Engine.....	24
New Traffic "Speedboy" Has 1½-Ton Capacity	24
Denby Now Marketing New ¾-Ton Truck.....	25
Truck Accessories.....	26
Shop Equipment for Fleet Owners.....	28
Van Dorn Horizontal Hoist Saves Body Space..	30
Motor Truck Electric System Wiring Diagrams....	31
The Fleet Owners' Forum.....	32
Editorial: Trucks to the Rescue.....	34

### NEWS

New York Prepared for Strike.....	35
Pacific Coast Is Not Worried by Strike.....	35
Federal Price Cuts Average 22%.....	36
Big Drop in Prices of Gasoline.....	36
Big Field for Buses in Ohio.....	37
Bus Franchise Costs 1 Cent Per Mile.....	37
Will Handle Indiana Truck Problems.....	38
Intensive Study of Road Service.....	38

Index to Advertisers.....74-75

## The Commercial Vehicle

Charles W. Blackman, General Manager

EDITORIAL DEPARTMENT

David Beecroft, Directing Editor

Sinclair Gluck, Managing Editor

F. Eugene Spooner, Technical Editor

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1908, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

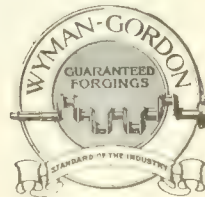
Chicago, Mallery Building, 59 East Madison Street  
Detroit, 317 Fort Street West, Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account	
of Zone Postage Law .....	.50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



There is no  
Substitute -  
FOR

Wyman-  
Gordon  
Quality  
and  
Service

WYMAN · GORDON  
*The* CRANKSHAFT MAKERS  
WORCESTER, MASS. CHICAGO, ILL. CLEVELAND, OHIO

# FEDERAL

Motor Trucks NOW at  
Lowest Prices in Seven Years

Capacities		Old Prices	New Prices	Savings
1	to 1½ Ton	\$2500	\$1800	\$700
1½	to 2 Ton	2725	2175	550
2½	to 3 Ton	3025	2425	600
3½	to 4 Ton	3950	3150	800
5	to 6 Ton	5350	4500	850

These reductions are not mere "cuts" in prices. In reality they represent another great Federal achievement in overcoming war conditions and getting back to a normal business basis.

**Such prices are possible solely** through Federal's enviable position in the industry. Federal is one of the very few companies to come through the readjustment period without a burdensome financial overhead — without over-extended factory facilities, without bonded or preferred stock indebtedness, bank loans and heavy interest charges that must be passed on to customers.

The Federal Motor Truck Company was never in as strong or as sound a financial condition as it is today. These new Federal prices, therefore, are rock bottom, based on lowered material and

labor costs and upon the increased efficiency and capacity of the great Federal plants.

**You can now purchase a Federal truck backed by eleven years tried and proven success at a lower price than in 1914 before the World War — at the lowest price now offered by any long and permanently established manufacturer of reputation.**

Federal Trucks have always been good trucks—\$75 000.00 now on the road demonstration. The Federal of today is an infinitely better truck than any preceding model, but its price is lower.

The Price is right—the product is right—the service is right. Every buying reason that appeals to sound business judgment says "Buy the motor truck you need now—say 'Feds'als." It's a false economy to do without motor trucks. It's a false economy to continue the use of units that because they are worn out or inefficient—cannot measure up to today's standard of performance.

FEDERAL MOTOR TRUCK COMPANY DETROIT MICHIGAN

Dealer's Signature)

## Think It Over

These radical price reductions as shown above, are being held prominently before the public eye on billboards, in newspapers and trade publications all over the United States. They will certainly bring substantial sales and profits to every Federal dealer.

If you can measure up to the standards of a Federal dealer, we will be glad to hear from you. All correspondence will be held in strictest confidence.

Will you share in Federal's success?  
Think it over!

FEDERAL MOTOR TRUCK COMPANY, DETROIT, MICHIGAN



# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXV    Nov. 1, 1921    No. 7

## **Community Owned Bus Lines**

### *The Latest Development in Bus Transportation—Is This the Final Stage?*

**B**US transportation has come to stay. It is a transportation factor with which we must reckon. That is the fundamental fact which stands out from the mass of plans and organizations and publicity on the subject.

To a greater or less degree, bus equipment is becoming one of the products of the automotive industry. And to a greater or less degree, with many different types of equipment, bus transportation is being installed all over the country, not as a temporary measure to take care of passenger transportation when other means fail, but as a permanent factor.

Once the fundamental value of this means of transportation has been established—and the bus could not have been adopted so universally if it were not of permanent value—there are two questions which logically follow. The first of these is the question of what type of vehicle is most efficient. The second is the question of the best method of organization and operation.

Each of these problems is in the experimental stage of solution. As regards the type of equipment, it has been found that different types are best for different localities. There are only a few cities in which double-deckers can be used to advantage, for example. Again, where rails are already laid and power-houses available, either electrically-driven trucks on rails or trackless trolleys may be most economical.

But given that gasoline vehicles are most efficient in a certain situation and under certain conditions, the question of how those buses should be organized and operated has produced some interesting experiments and passed through some instructive stages of development.

First we had the jitney bus—a single bus or even a touring car, operated by a single individual and plying for hire without franchise, without regulation and without responsibilities. When this type failed—as it did fail and is failing in many instances—there developed the bus line, operating a number of buses, more or less responsible, more or less regulated and financed, but owned by a company or corporation. Of this class, the de luxe example in this country is the Fifth Avenue Coach Co., not only operating buses itself but manufacturing buses for other lines.

Now a later stage of development is marked by the Washington Rapid Transit Co., which is practically a community owned proposition. This is a highly successful bus line, started only this year and based on making the users of the buses stockholders in the company. A full account of how this was done is given in the next two pages. Is this the best and therefore the final stage of gasoline bus organization? That question is hard to answer now. But at least the career of this novel venture is very well worth watching.

# Selling the Bus to the Passengers

*How the Promoters of the Washington Rapid Transit Co. Literally "Sold" the Bus Line to the Community*

By F. Eugene Spooner

WHEN W. Elkins Reed and William P. Killeen, promoters of the Washington Rapid Transit Co., first conceived the idea of running a fleet of buses in the Capital, they were faced with two problems: the financing of the initial fleet installation and the overcoming of local prejudice.

The fact that both Reed and Killeen had been residents of Washington for many years and were personally known to a large number of its citizens did not lessen to any degree the apathy of their friends or the public in general towards the bus proposition. Bus lines in Washington represented no new line of endeavor to the citizens of that city and most of them still remembered the half-hearted attempt that was made some years before by irresponsible bus owners to invade that field. Poor service and equipment had been the cause of failure and there was naturally no reason to believe that bus transportation could or would be improved by anyone else.

## Pioneering Started

Both of the promoters, however, realized that in order to carry through their plan, they would have to show Washington residents and those to be interested financially just what first class equipment and service meant. They also realized that it would be necessary for them to study bus transportation in those

cities where it had succeeded. Arrangements were then made to meet the foremost men in the bus field. The results of these consultations only added to their enthusiasm and assurance that bus transportation in Washington could be handled successfully.

But having started out in a business-like manner to make sure that they were right, it did not take the promoters long to persuade some far-sighted citizens to help out in the early financing. Two of these men were in the wholesale meat business, another was a wholesale produce merchant, while the others were in various other lines of business. A total of \$92,000 was raised to finance the purchase of fourteen buses. The company was thereupon incorporated with a capitalization of \$250,000 in common and \$50,000 in preferred, both classes of stock having a par value of \$100.

The buses started operation on March 1, 1921. Guided by the errors and mistakes of operators of this type of transportation in the past, the company set about to win the approval and commendation of the potential patrons of a public service corporation. Realizing that large areas of the city were not served by any means of public transportation and that the electric street car lines with their enormous investments in trackage, wires, powerplants, etc., would not be warranted in extending service without adequate assurance of sufficient patronage to pay for the exten-

sions, the company sought out newly developed districts which at that time were in need of transportation facilities. Two routes were selected and with the exception of four blocks on Pennsylvania Avenue covered in the downtown loop, no paralleling of the trolley lines occurred.

## Public Approval

Evidence of the reception accorded this bus service is shown in the order issued by the Federal Utilities Commission on April 1, directing this company to install motor buses on two additional routes, serving sections closed to other types of public transportation. These orders were issued in response to numerous letters, petitions and oral requests from residents of thoroughfares over which other forms of public service were prevented from building their lines.

The confidence of the riding public has been won simply because the company has installed a well organized service and excellent equipment. During the rush hours in the morning and evening, buses run on a 5-min. schedule. During the off hours, they run on a 10-min. schedule. These schedules are adhered to day in and day out. The buses are standardized, being of Duplex design. These 2-ton chassis carry a body that seats twenty-one passengers and also has standing room for eleven additional passengers during emergency hours. Everything has been attended to as regards comfort for the passengers.



The original installation of ten Duplex Limited buses which the Washington Rapid Transit Co. started operation



Proper sanitation of the buses is assured by a thorough renovation weekly and each bus is equipped with an adequate heating system placed under the seats. From time to time as new equipment is installed, improvements will be made.

The officials of the company during the pioneering days, and for that matter during the present time, have made it a point to attend most of the meetings held by the district citizenship associations. They realize that it is here that public opinion is brought to a head and as a result they are always prepared to answer all questions that may arise concerning the opening up of new routes. Occasionally they are forced to dampen the interest taken in the desired opening up of certain routes, being forced to do this because of lack of equipment to take care of a rush hour load only without business at other times.

As a result of the order emanating from the Public Utilities Commission last April, the company was forced to add four more buses. Since then four more routes have been added, necessitating the addition of sixteen more buses. These will be placed in operation this month.

**New Buses Ordered**

In the meantime, the company is seeking more working capital to finance the purchase of these new buses, etc. As the company has grown in popularity, it has become apparent that all shareholders should have equal voting powers. As a result, the preferred stock has been retired and the company recapitalized with 50,000 shares of common stock, each share having a par value of \$10.

It is the desire of the company that its stockholders consist only of those who ride daily in its buses rather than a few individuals holding control. It is conducting the sale of this stock directly from its office as a matter of business economy—no high brokerage commissions are paid, no expensive stock offices maintained, and no stock given away for promotion or bonus purposes.

The company has no bonded indebtedness. Only one of the executive force is a salaried man and the overhead ex-

pense amounts to a little over \$1,500 a month. It has been stated that but 3500 passengers carried daily are all that is necessary to make both ends meet. A little over 5500 passengers is the daily average at the present time.

The buses are now making eighteen 9-



W. Elkins Reed, president Washington Rapid Transit Co.

mile trips per day. It is stated that the cost per passenger is 6 1/3 cents. The cost per mile is 19 cents, each trip averaging twelve passengers. The fare is 8 cents.

Ever since the company has been operating its buses it has always reported, with one exception, a monthly profit to the Public Utilities Commission. The July report showed a loss of \$81.70. This was due to the summer vacation which was then on in full blast.

During the past two months, considerable money has been spent for advertis-

ing, experiments, etc., so that the profits during the first seven months do not amount to much. But now that this necessary expense has been dispensed with, the company expects to make enough to pay dividends in the future.

The doubling of its equipment will add from 8 to 10 per cent in the overhead expense, it is estimated. On the other hand, it is expected that there will be a 70 per cent increase in revenue.

Though not operating under a franchise, the company enjoys the privileges of a franchise under orders from the Public Utilities Commission. In scope, these orders are perpetual and cover the entire City of Washington.

**Rules and Regulations**

So long as the company adheres to the rules and regulations governing the operation and equipment of the buses, it need fear no other bus competition. The trolley companies are in full accord with the purposes of the bus lines and really welcome the assistance in handling the peak loads during the morning and evening hours.

The Public Utilities Commission audits the books of the bus company about every three months. The buses, as well, are inspected frequently by the Commission. When accidents occur, the bus company is required to submit a full account of such to the Commission. The buses must then be held for forty-eight hours to permit of inspection by a representative of the Commission before repairs are made. No new bus equipment must be ordered or purchased for service before its plans and specifications have been approved. Moreover, no material change in equipment, plan or arrangement may be made unless approved by the Commission.

With all of the foregoing rules and regulations, it is manifest that the intention of the Commission is to bring bus transportation to the highest level. With a "Public First" attitude, such as is clearly shown in the functioning of the Washington bus system, it is also manifest that bus transportation in that city will be permanent.



March 21, 1921. Sixteen more buses of Duplex design will soon be added to take care of a number of new routes



# The Need for Real Driver Credentials

*If the Best Man Is to Get the Job, the Truck Driver Must Have Credentials That Mean Something. What It Means to Be an Expert Driver*

BELOW is the gist of a speech, delivered before the Chicago Motor Drivers' Instruction Course, by Norman F. Smith, Superintendent of the Consumers' Garages. Mr. Smith's discussion of the owner-driver problem in its relation to the need for definite examination credentials for drivers and what goes to make a good driver, have many points of interest to fleet owners.

"For nine years I have worked day in and day out with you fellows, and perhaps you will agree with me that we understand each other fairly well.

"I have one reason for being interested in this course that holds a lot more importance in my mind than a dozen others that I could name. One reason that I think you will agree is of more importance to you:

"You will remember in our first meeting how Coroner Hoffman and Mr. Alden mentioned the skill and qualifications of the locomotive drivers. They said that every night, all over the country, thousands of people lay down to sleep in the express trains, peaceful and contented, safe in the knowledge that the man who was at the throttle of that train smashing through the night, was not only on the job—but that he was a master of his trade, and *knew* his job.

"Now, my main reason for interest in this course is that I want to see all of you fellows out in front have that same high standard of skill. Then the community, as a whole, will have *real* safety, and what is more important, *you* will be safe. You will have a knowledge that will get you bigger pay and will stop some 'hick' from stepping in in your place—just because he offers to work for less.

## The Employer's Problem

"Take an example: Nearly every day I have four or five men coming in to my office looking for a job. I've never seen them before, and maybe I have a job going. Which one am I going to give it to? The way things work out now it's a man's past record, and the way he answers the tests we put before him, that determine whether he will land the job or be told, 'we're sorry.'

"But many a good man, many a good driver, gets fussed, rattled under such questioning, and, no doubt, we have passed up a lot of good men because they lost their nerve and made a lot of fool answers.

"I might say right now that it doesn't take us more than a few days to find out

the boneheads, but a *plausible* bonehead may have cost a less easy talking *good* man the chance of a job.

"And, where the owner has only one or two trades—a bonehead with this gift of gab can come in and *get* a good man's job. You know quite well that most owners don't know a good driver from a bad driver. But, supposing there was some way in which we could train all drivers and where we could give them some diploma or examination ticket to show that they were skilled men. Wouldn't that be a big help? Wouldn't that show up the bonehead? I think it would. I can't tell you how often I've wished a man could walk in to me with some such credentials—something, that would *show* that he knew his job. I tell you that that



## How Do You Hire Drivers?

This superintendent believes that there should be a definite standard and definite credentials to protect both owner and driver when a man applies for a job.

In the meantime, drivers must learn to realize their responsibilities and the possibilities of becoming real experts.

Mr. Smith describes what he means by a real expert driver.

There are some valuable hints in this speech, for both you and your drivers.

Read it and—

## Tell It to Your Drivers!



man would get *more* than a chance to show what he's got. I'd think a long while before I'd let some foreman's personal grouch make me 'fire' a man like that. The trouble is that any fool can climb into the cab of a truck and jerk it out into the road; but no fool can *drive* it the way it ought to be driven, and care for it. That requires a skilled man—you men *know* that. How do you feel about it?

"Don't doctors, lawyers and other professional men take pretty good care that no man without the proper qualifications can enter their ranks? Do they let some half-baked imposter step in and cheat them out of their legitimate work? They do *not*.

"Does the Society of Locomotive Engineers permit an unskilled man to compete for the job of the man who is trained? It does *not*!

"Then why should you men who are skilled; men who have spent some of the

best years of your life in learning your trade, why should you not want this same insurance against the competition of this untrained man? I take it that you do, and our aim in this course is to provide you with all the useful knowledge that we have at our disposal, or can get.

## Examinations Coming

"The time is not far distant when, before a man will be entitled to drive a truck or motor car, he must pass a driving test to get his license. That's a good law; an honest law; and a law that protects the good driver.

"In Massachusetts to-day there is a written and an oral test for any one who applies for a license to drive a motor vehicle. It is tests such as these that I foresee in the near future, that this course will help you to pass. But, it is more than that that leads me on in this work. It is seeing the profession of motor truck driving just as highly skilled as any other trade. That will take time. We aren't going to bring that about all at once; and it's going to succeed or fail just as you men out there decide. The very fact that you are here to-night shows a desire to learn something. We will all do that.

"If I tell you of my experience with lubrication, it may benefit you. I have found that over 50 per cent of the repairs to trucks are the result of bad lubrication—or no lubrication at all. Each make of truck has its own design. Some have 32 grease cups—some 74—and some only 8. But, whether they have 1 or 80—they are important; they weren't put there for decoration.

## Missed a Grease Cup

"The other day a truck limped into the service station of a company I know, and the driver said: 'Something's wrong; this old bus ain't running right—seems to *grab* off and on!'

"The mechanics got on the job and underneath the frame they found a grease cup, with the original factory paint still unbroken. They pointed it out to the driver. The old bonehead began to laugh: 'Well! I didn't know I *had* that one.' He didn't either, and it cost him about \$100 to find it out. That's expensive experience! You know as well as I do that you can ruin a truck in a week if you don't give it oil enough. I think that that is one of the surest tests—whether a man takes interest in his truck or not—lubrication—and strangely enough, although it's the most important feature of the taking care of



a truck, it is the one most neglected. It is so easy to forget! The absence of oil or grease does not make itself felt until *after* the harm is done—then it's too late.

"I would suggest that you consider these three things—and *make* them a habit:

"1. Cleansing.

"2. Inspection.

"3. A standard method of lubrication.

"I have found out that the system that we are now using will enable us to properly lubricate a truck for \$18 per year. There is no question that by so doing we add at least a year to the life of the equipment. Is it worth it? If you own your own truck and could get another year's wear out of it for \$18—would you do it?

### What Cleansing Means

"By cleansing I mean: Don't just give a truck the 'once over' when it's caked with dirt; that isn't going to show you anything. The muck hides it all.

"Inspection should be a mighty thorough look around, and, say once a week, a tightening up of loose nuts; and a general 'trouble shoot.'

"By a standard method of lubrication I mean that every four or five days such and such grease cups should be filled, and on other days—other cups at times when they ought to need it. Make a list of these cups—and opposite groups of them with the dates on which you intend to fill them, and stick to your list. Drain your case oil once every 1000 miles, and use it to wash down your springs. Make it all a habit, it will come much easier if you do, and you will be surprised at the result. If your boss kicks at the time you take for such work, *educate your boss!*

"I believe that a great deal of a man's safety depends upon the condition of his equipment. It may seem a 'round about'

method but I feel sure that by having one's truck in good running order—and knowing how to keep it so—any driver will be far less liable to accident. Lots of accidents, for example, can be directly traced to the condition and adjustment of brakes and steering linkage.

### Why Trucks Are Governed

"It may interest you to know that the reason why the manufacturers govern the speed of their trucks is not solely because of the damage done to the truck, but more because they have found no proper way to brake heavy weights going at such speed. It is nine times as hard to stop a truck going at 15 miles an hour as it is at 5. If the same truck went 20 miles per hour it would be 16 times as hard; and if it hits anything it is going to be 16 times as tough a punch as if it were only going at 5 miles. If it went 25 miles per hour it would hit you just 25 times as hard; and that's fact enough for this argument. I do not want to be hit by any truck at any speed whatsoever. I've had some.

"As regards the blow that it delivers when it hits a bump or small rut: A truck that at 10 miles would hit a blow of 10,000 lbs., would at a speed of 20 miles deliver a hammer blow of 40,000 lbs., or 4 times as great a blow.

"To show you how misdirected some companies' safety efforts have been, I would call your attention to the Chicago railroads. Due to level crossings they used to kill about 600 people per year. At a cost of many millions of dollars the roads were raised to overhead lines, and—they keep on killing 600 people every year! Why? Because they did not look directly at the real trouble. They did not actually keep the people from walking the tracks. While the chance pedestrian would no longer ramble on this surface in front of a train, the man who saw the smooth walk offered

by the upper new track, took advantage of it to go back and forth with this result I have just given you.

### Safety Means Thoroughness

"That brings me to my point. Some safety methods are good on the surface and poor below, and you can't *scare* anybody into being careful. It's wasted effort. But you can, by careful help with people, *make* them careful—and cause caution to become a habit, and above all it is the novice that is dangerous. Ignorance is an awful stumbling block when a man has to act quickly. The man who knows his job has a better chance of getting out of a tight squeeze than the bonehead. Therefore, I say, know your job—and know your equipment. Perhaps it would interest you to know what damage such a thing as poor lubrication can do to a truck. For example:

(Here followed a list of lantern slides depicting the accidents and damage due to improper loading, driving and maintenance of motor trucks and parts.)

### Trucks Not Always Safe

"In closing I wish to ask you were those trucks that contained those parts easy to run—always under control—and safe? No! They were *Not!* And if they were not safe, who in or near them in the street was safe?

"I maintain that they were just like some men, walking around with a bad disease and liable to cause a heap of trouble at any moment; and as such they have no business to be upon the streets.

"Now, I may never have the opportunity of speaking to some of you men again, so I want to say—and emphasize my statement—that the only sure road to *real* safety lies along the line of keeping not only your truck in good condition, but keeping yourself master of the job."

## Private Road Construction Interests Face Competition

### War Trucks Turned Over to States for Road Building Work

VIRTUALLY all the surplus motor vehicles turned over by the War Department to the Department of Agriculture for distribution among the various States for road building purposes have been distributed through the Bureau of Public Roads. Up to July 1 last a total of 22,577 motor vehicles had been so distributed.

The total number of vehicles so far allotted to the States approximate 528,000. Up to July 1 last there had been distributed 21,124 trucks and 3229 automobiles. Distribution of the motor vehicles among the various States up to July 1 was as follows:

Alabama	497
Arizona	302
Arkansas	457
California	690

Colorado	422	New Jersey	368
Connecticut	146	New Mexico	573
Delaware	62	New York	1,150
Florida	273	North Carolina	552
Georgia	723	North Dakota	333
Idaho	303	Ohio	899
Illinois	1,043	Oklahoma	502
Indiana	652	Oregon	338
Iowa	665	Pennsylvania	973
Kansas	692	Rhode Island	50
Kentucky	459	South Carolina	349
Louisiana	521	South Dakota	374
Maine	205	Tennessee	544
Maryland	228	Texas	1,337
Massachusetts	226	Utah	261
Michigan	743	Vermont	105
Minnesota	642	Virginia	448
Mississippi	430	Washington	346
Missouri	760	West Virginia	251
Montana	443	Wisconsin	521
Nebraska	510	Wyoming	257
Nevada	214		
New Hampshire	108	Total	22,577



# Is Store Door Delivery Coming?

*An Interesting Discussion of the Pros and Cons of This Method of Handling Shipments, with Its Application to Shippers in General and the Views of Traffic Managers*

By Albert K. Weinberg

THE news that the Federal Highway Council has proposed a system of store-door delivery for the city of Baltimore, Md., appointing a deliberating committee consisting of representatives of the railroads, the shippers, and the Council, is of moment to every owner of a motor-truck fleet.

The fact is that the question of store-door delivery, long mooted theoretically, is now being definitely considered with respect to the needs of one of the country's largest cities. Even more important is the consideration that if store-door delivery should be adopted in Baltimore, it may very well be the cause of a similar system all over the country, since the Interstate Commission may conceive its limitation to Baltimore as a discrimination, which in case of complaint by shippers, would warrant its institution in other cities.

## Arguments For and Against

The argument over the ultimate value of store-door delivery is very keen, those who advocate the system and those who oppose it being equally positive. On the one hand it is held as the panacea for all ills of terminal congestion, an agency for the greatest economy to the railroads and for better delivery to the shipper. On the other hand it is assailed on the three chief grounds of increasing the railroads' liability, lessening the profit of transfer companies, and being unnecessary in view of the virtual store-door delivery that now exists through transfer companies holding blanket orders for the delivery of freight.

The National Team and Truck Owners' Assn. went on record as being opposed to store-door delivery. As regards the situation in Baltimore, store-door delivery seems to be favored by the Federal Highway Council and by the Merchants and Manufacturers Association of Baltimore, while the railroads have a basis for reserve in the fact that store-door delivery may possibly mean an increase of their expenses through their liability being extended to consignee's door instead of only to freight platform.

Opposed to store-door delivery or in favor of it, there are two important points in the situation for the owner of the motor-truck fleet to remember. The first is that there are many possible types of store-door delivery, affecting his interests in totally different ways and therefore deserving different degrees of approval or of hostility. The second, of concern to the motor-truck transfer company, is that the possibility of store-door delivery being instituted demands a propaganda for the motor truck of the greatest urgency and persistence.

## Views of a Traffic Manager

What sort of a store-door delivery may be expected as the probable result of a favorable action on the part of the Baltimore conference? It is obvious that this question cannot be answered dogmatically. On the other hand considerable significance should be attached to such a document as the address of A. E. Beck, traffic manager of the Merchants and Manufacturers Assn. of Baltimore, before the Federal Highway Council on Dec. 10, 1920.

Mr. Beck, a member of the conference which is to decide the question of Baltimore delivery, discussed comprehensively in this address the various elements that enter into the store-door delivery problem, and outlined the position he will take.

Considering Mr. Beck's address from the standpoint of the motor truck fleet owner, the first noticeable point is that the store-door delivery is not proposed as a carrier service. The transfer company, as frequently at present, will perform the service as the agent of the railroad, and the service will be paid for in addition to the rate.

This is a concession to the railroads, made to secure their co-operation, in view of the fact that the railroads would resent the store-door delivery being performed under the carriers' liability to damage. The difference between the proposed store-door delivery service and the store-door delivery service practiced to-day in New York, Chicago, Philadelphia, Boston and other cities, is that under the latter systems the transfer companies are given orders by the individual large consignee for the immediate removal of freight, while under Mr.

Beck's plan the transfer companies would remove from the freight platform all freight upon arrival.

## Independent Haulers Considered

As regards the form of drayage service to be employed the attitude is likewise moderate and conciliatory, the promoters recognizing that this must vary with the individual circumstances.

"In my opinion," says Mr. Beck, "where consolidations (of transfer companies) are possible they should by all means be encouraged, but where it is impossible, then divide the terminals among them and charge them with the responsibility of keeping those terminals free of freight. They must be bonded in a sum satisfactory to the carrier whose terminal they serve, and financially able to pay the carrier the freight charges upon each shipment delivered to them. These charges, in turn, should be collected, from the consignee, together with the drayage charges; and the transfer company should be in a position to extend the customary credit to consignees when request is made therefor."

The system proposed for store-door delivery is the division of the city into a number of delivery zones or areas from and to which drayage is to be performed, to and from particular or designated stations.

The extent of delivery will be determined by a definite line of demarcation, corresponding approximately to city limits, beyond which delivery will only be made on the payment of graded extra charge. In the case of city where there is competition between a number of trucking companies under this plan, the different zones would be assigned to different companies, which would acquire greater efficiency through specializing in a single zone.

## Primary Basis Charge

Mr. Beck believes that the grade of drayage charges should be arrived at by determining primarily a basis charge which applies to the manufacturing and commercial centers of the city. The basic charge is to reflect the cost of service plus a reasonable profit formula.



and the charges to other sections would be derived in relation to it.

Charges, except in the case of isolated shipments to infrequent consignees, would be kept down to a minimum. In Mr. Beck's opinion, it is unfair for a transfer company to assess a minimum charge of 75c. to \$1.00 against a single shipment to a consignee, simply because there happens to be one package in a particular lot while at the same time, or at least on the same day, deliveries of several lot shipments are made at the straight rate.

The statement of the transfer companies of the old Baltimore store-door delivery is quoted to the following effect: That if all the less than carload business of a particular terminal were given to them for delivery, as in the former days, they are confident that the volume of business so handled would permit them materially to reduce the present cost to the consignee.

### Charges and Zones Published

Drayage charges and also zones should be published as a part of the carriers' tariff, so that other necessary rules and regulations of the store-door delivery service can be formally provided, and so that the zones and charges will tend toward a stabilization.

It is not proposed to make the store-door delivery apply to carload delivery, but only to less-than-carload lots, as congestion at terminals is due primarily to the accumulation of less-than-carload freight being customarily loaded and unloaded by the shipper or consignee at a private siding.

The service should, however, be one of collection as well as delivery. This plan enables great economy of time as drivers can combine collection of freight with delivery of freight through a knowledge of just who would probably have freight moving at certain times of the day to the freight station.

Mr. Beck makes a great many proposals for the system in considering the points on which objections may be made by the consignee. Where the consignee has more than one or two establishments or warehouses, delivery can be made at designated places provided the shipments are so marked. Delivery should be limited to the ground floor of industrial and commercial establishments, except where the building is provided with elevators, freight chutes or slides. This proposal follows the example of the rule of the express companies in this respect.

### Individual Collections Discouraged

In the case of refusal of consignees to accept shipments upon tender such shipments should under tariff be placed in public storage, subject to the usual penalties. The objection of consignees as to the right of 48 hours free time should be covered by eliminating this right from the tariff of the store-door delivery traffic.

As to the use of individual trucks

and teams by consignees, Mr. Beck holds that they should not be permitted to call at the freight stations for incoming freight. He advocates, however, the privilege of such owners to haul to the stations such outbound freight as may be ready for shipment between the collections of the duly authorized transfer agent. Store-door delivery is presented as relieving the individual owner's trucks and teams for uses other than the direct haulage of freight, a score on which a number of industries are complaining at the present time.

Next there is the problem that would confront the transfer companies owning



### A Big Step in Transportation

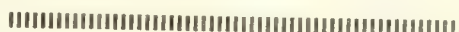
Linked with proper terminal facilities and organization, store door delivery may well prove an immense forward step in the transportation of commodities and the development of industry.

The Federal Highway Council, which is mentioned here as taking steps toward the eventual installation of store door delivery, is inactive at the present time. On that account, it is of great interest to learn that the National Highway Traffic Assn. is taking up the matter of store door delivery with enthusiasm.

There is much of benefit in this plan to both shipper and consignee, as well as more and better organized business for the common carrier.

If you believe in store door delivery, tell us so and let us be the medium for bringing your views to light and furthering the common cause.

### Let Us Hear from You!



motor trucks in the event of the inauguration of this plan. As stated above, the owner of the motor truck fleet must prepare himself for the task of convincing the railroads that it is to their advantage to use motor trucks as opposed to horse drays.

A point to be emphasized in his propaganda is the striking efficiency and speed to be acquired through equipping motor trucks with demountable bodies. Only through the use of demountable bodies can the real purpose of store-door delivery service, the immediate clearance of the freight station platforms, be achieved.

### Demountable Bodies a Feature

There are to be emphasized the points illustrated in the experience of the American Wholesale Corporation in the use of motor trucks and demountable bodies; that an initial cost of \$15,000 in demountable bodies and the necessary equipment brought in a saving the first year of \$22,000; that the deterioration

of the original equipment is extremely slight; that the time of unloading was reduced from 1½ hrs. to between 5 and 10 min.; that the shipping facilities of the house were doubled although no more truck equipment was added, and that the use of the demountable bodies obviated the expenditure of between \$100,000 and \$200,000 for the construction of new loading facilities.

There is also the even more striking record of economy in the hauling of railroad freight by the Cincinnati Motor Terminals Co. The system of the Cincinnati railroads may set the model for the working of a store-door delivery system by motor-trucks. The following description of the system has been made by its president, B. F. Fitch, before the Material Handling Machinery Association.

### The Cincinnati Plan

"Briefly, this installation consists of overhead rails, electric cranes, electric hoists, motor-trucks and a plurality of interchangeable motor-truck bodies. The system of operation requires an empty body for each station movement demand of the railroad on its inbound main station platform. At the larger stations there are several locations for such body settings, thereby decreasing the hand trucking distance for freight.

"As the freight comes from the cars, it is hand-trucked to the nearest location containing a body carded for any connection or any sub-station.

"When loaded, these bodies are sealed and under telephone order of a joint dispatcher, employed by the railroads, mechanically loaded onto trucks and thus routed over city's streets to make the proper connection.

"On arrival at outbound platform of the connecting line, the body is mechanically removed and an empty body, previously unloaded, is similarly put onto a motor-truck chassis for delivery to the inbound platform of that house, where the operation is repeated and another loaded body forwarded in the same manner to some other freight house.

### The Return Load Problem

"If the load happens to be to a sub-station, it remains on platform until the dispatcher is advised by the agent at the sub-station that a return load is available. Then the loaded body of inbound freight to that sub-station is forwarded and the motor-truck exchanges the same for the previously reported load of outbound freight to be delivered at the main station, where it is consolidated with other city freight in line cars made up daily to innumerable other destination points."

The Cincinnati experiment has proven that cooperation between railroad and motor-trucks is the basis of a truly scientific and economical transportation. Store-door delivery by carrier must look to the motor-truck for its success; this is the point which will now be unceasingly preached by owners of motor-truck fleets who are truly far-sighted.



# Trucks in the Oil Fields

## *How Drivers Are Paid. Ingenious and Comprehensive Cost Keeping System*

By I. F. Toombs

**I**T is when man is up against something new—when his originality and ingenuity is taxed—that his productive and inventive powers are highest. It is then that he accomplishes things worth while.

In most lines of trucking, there is a good deal of previous experience and procedure to guide the new operator. Hence, novel, ingenious and valuable methods and expedients are not so frequent as they might be. But in the installation of a big fleet in the oil fields of the Midwest Refining Co., there was little guiding procedure on which to draw, so that the final installation and method of operation designed by the man in charge of the operation now has many interesting and novel features.

In the first place, there was a good deal of opposition to installing trucks at all. But the superintendent of transportation purchased two trucks as an experiment. The sand on which they ran was deep and six months in the year the snow and mud was up to the horses' knees. But the trucks were satisfactory. That was three years ago. Now the fleet consists of about sixty trucks.

### **How Trucks Were Bought**

There was no complete truck standardization at first. About forty-five of the trucks are equally divided between three standard makes. About a dozen makes compose the other fifteen trucks which, altogether, permits the study under actual conditions and for future purchasing of about fifteen of the leading makes

of trucks manufactured in the United States.

It was also found that the standard tread truck was the most successful. This tread permitted the truck to follow in the track of the automobile or the wagon, reducing the wear on the tires, as well as gasoline and oil consumption.

The two-ton rear drive truck proved highly successful from May to October. But after October the superintendent depended largely upon the four-wheel drive trucks.

The company has a unique and clever arrangement for poling all the trucks together when the snow is over two ft. deep. An extension has been added to the front and rear of the truck frame and between the ends is attached a roller or pipe swivel with irons welded on to attach to an iron pole. Each truck is thus equipped and sometimes ten trucks are poled together. Then when one loses traction, the balance either push or pull it out.

### **Truck Standardization**

In 1919 a meeting was called of all field superintendents and other officials to standardize all equipment. They had fifteen makes of trucks and about eight makes of cars and it was difficult and expensive to keep this equipment up to standard and keep the personnel specialized on all of it.

It was decided to standardize on a 3-ton, 4-wheel drive truck for heavy duty and a 2- to 2½-ton rear drive truck for lighter duty. No other type has been bought since that meeting and now costs do not vary more than one cent per ton-

mile per month, except under unusually severe winter conditions.

The company has also developed a very complete cost keeping system of its own which shows the profits and losses on each truck by the day and by the month. One sheet from this system is shown on page 15.

### **How Drivers Are Paid**

The drivers were formerly paid by the month whether they worked or not and under this system many trucks were run into the shops for minor repairs. Now the men are paid a straight commission, depending on the season and the condition of the roads.

The drivers earn approximately 25 cents per 100 lb. for all tonnage delivered from Casper to Salt Creek. There is very little return freight.

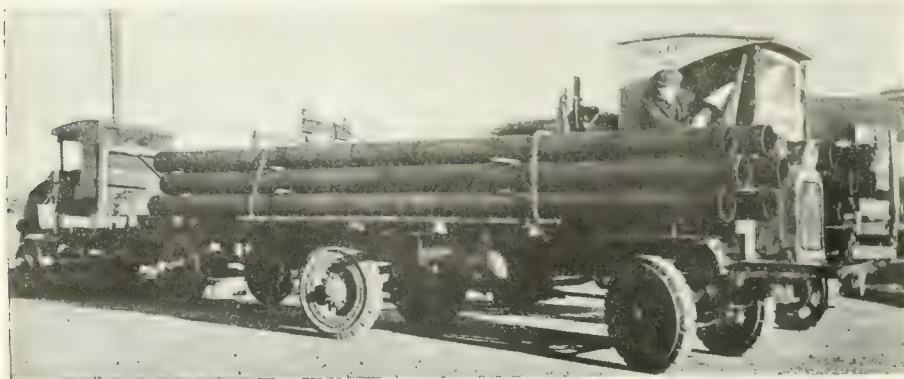
This may seem an exorbitant rate, but the method has been found very profitable and successful. The cost sheet shows that only three drivers earned less than \$370 during the month of January. One earned \$27.50, as his truck was only operated two days. It was a light duty truck and was not required. Three drivers earned over \$400 and one earned nearly \$500, which is a very remarkable showing. At the same time they made more money for the company and kept the trucks in better condition than they did before this system of payment was put into effect.

The drivers are responsible for their trucks morally and financially only in so far as it affects their earnings. The drivers do all the minor repairs on the road now, and only run the truck into the shop for major repairs.

### **Estimating Earning Power**

The earning power of the trucks is, of course, estimated on a tonnage basis. While hauling on this basis the trucks are always under the supervision of the truck department and this department is responsible for such operations. The company then pays this department the same remuneration that they would pay to outside freighters, which is the standard rate of \$1 per 100 lb. from Casper to Salt Creek.

As will be noticed on the cost sheet, the company divides the day basis work among the different trucks, as the drivers do not make as much money working in that manner, and it would be unfair to give the majority of the work to one



*This illustration shows twelve huge casings loaded on the sides of a truck. This is the method of transporting casings where a trailer is not used. It allows the front wheels to carry a fair percentage of the weight of the load*



of the drivers. The earnings for the tonnage and day basis are accordingly separated and the next two columns of the cost sheet show the total earnings and the total cost and the last column shows the total gain.

The lower part of the cost sheet has a recapitulation showing the entire tonnage hauled by each truck as shown in pounds, the total number of miles each truck traveled, the number of round trips made together with the average distance.

The next column shows the cost per ton-mile as hauled by each individual truck, also the number of miles per gallon of gasoline and the number of miles per pint of oil. An accurate check is kept on these items and if a driver is not getting all the mileage he should, he is checked up by an expert. Many instances of error and deficiency common to truck drivers have been found and corrected by this method.

Before the commission system was installed, the company tried out some recordographs, but the drivers did not give them proper care and accurate data could not be obtained from them. This company's experience shows that such a system is satisfactory if the trucks are returned to the garage every evening. But in the oil fields, trucks are occasionally out two and three days at a time and the recordograph cannot be properly taken care of by the office.



The upper view shows a truck hauling a huge tank on a 2-wheel trailer a distance of 45 miles. The tank weighs about 15 tons. The lower view shows a tractor and 5-ton trailer hauling a 22-ton engine base. The five trucks hitched on behind are braking the load

MIDWEST REFINING COMPANY																			
MONTHLY TRUCK REPORT																			
JANUARY 1921																			
TRUCK	TNS	GAL	PNT	AMOUNT	SHOP		DRIVER'S EARNINGS	MISC. EXPENSE	DEPRECIATION	TONNAGE COSTS	DAY BASIS COSTS	EARNINGS		TOTAL		GAIN	LOSS		
					LABOR	SUPPLIES						TONNAGE	DAY BASIS	EARNINGS	COST				
33	442	480	15876	8883	21403	314	23	7895	6427	91677	3360	120360	40 00	1243 60	950 37	293 23			
34	361	244	11152	16306	14865	199	70	5066		66122	3754	77300	40 00	812 00	698 76	113 24			
345	725	454	22146	6238	14348	420	69	7912	18700	112413		191795		1917 95	1124 13	793 82			
346	532	378	16695	3588	5418	376	92	7912	17463	86215	2719	148090	40 00	1520 90	889 34	631 56			
347	554	296	16605	28863	19408	371	74	6846	18700	124730	5079	146016	40 00	1500 16	1298 09	202 07			
348	710	608	23612	1440	3380	487	87	8782	18700	102484	2686	193471	40 00	1964 71	1051 70	913 01			
353	58	14	1551			27	50	633		6048		11000		110 00	60 49	49 52			
359	517	406	16952	4183	7976	380	06	8229	22045	93033	5283	147670	70 00	1546 70	983 21	563 49			
360	531	414	17121	7568	12711	383	37	7280	22045	110062		163345		1533 45	1100 62	432 83			
375	655	384	19753	12736	19710	395	39	7279	18438	114809	4119	155480	40 00	1594 80	1189 28	405 52			
376	678	311	19512	6483	3390	432	41	7912	18438	98976		172965		1729 65	989 76	739 89			
	5773	3989	180855	96488	122509	3789	94	75215	180042	1006574	27000	1516392	310 00	1547392	1033574	513818			

TRUCK	TONNAGE	MILES	TRIP	MILES PER TRIP	COST PER TON MI	MILES GAL GAS	MILES PNT OIL
G3	122010	1620	18	90	.166	3.6	3.2
G4	77200	990	11	90	.181	2.7	4.0
G45	165780	2160	24	90	.16	2.9	4.7
G46	155115	1926	22	87.5	.128	3.6	5.0
G47	148760	1770	20	88.5	.189	3.1	5.9
G48	193051	2430	27	90	.117	3.4	3.9
353	11000	180	2	90	.122	5.1	2.8
359	156490	1836	21	87.4	.135	3.5	4.5
360	153345	1980	22	90	.159	3.7	4.7
G75	155480	1980	22	90	.164	3.0	5.1
G76	179589	2184	25	87.3	.113	3.2	7.0
Totals	1,517,820	19,056	214	89.04	.147	3.3	4.6

	TONNAGE	DAY BASIS
Total Earnings	\$ 15,163.92	\$ 310.00
Total Cost	12,065.74	270.00
Net Gain	\$ 5,098.18	\$ 40.00
Net Loss		

	TONNAGE	DAY BASIS
Total Cost Tonnage Basis		\$10,065.74
Total Tons Hauled		758.91 Tons
Average Distance Per Trip		89.04 MI
Average Cost Per Ton Per Mile		.147¢
Average Cost Per Cwt Per Mile		.007¢

EXPLANATION MISC EXP	
Watchman S C	105 00
Office Exp	375 00
Garage Exp	272 15
Total	752.15

REMARKS Cost per Cwt to Salt Creek (90 miles) .661¢  
Cost per Cwt to Tea Pot Station (60 miles) .441¢  
Cost per Cwt to Muddy Field (36 miles) .264¢  
Cost per Cwt to Midway Rest Well (24 miles) .176¢

A sample cost sheet as designed for the Midwest Refining Co. truck service. The sheet shows the individual record for each truck and the recapitulation for the fleet

# If Your Truck Costs Seem High—

## Compare Them With These Cost Figures, Obtained From 750 Operators Using From ½- to 2-ton Trucks

A RECENT extensive investigation into the use of trucks on eastern farms has brought some very valuable facts to light, not only on the average sizes and types of trucks used and the lengths of runs made, but also on the costs of operating these trucks.

The investigation was limited to farmers who had owned and operated their trucks for more than 6 months. No second hand trucks were included in the final averages.

Eliminating the above, the remaining operators on whose experiences the final figures are based totaled 753, a number large enough to guarantee a good deal of reliability to the averages obtained from their figures.

### Annual Use of Trucks

The investigation showed that the number of miles per year which a truck travels has a direct bearing upon the cost per mile run and per ton hauled, and the prospective purchaser should give careful consideration to the amount of use which he will have for the truck. The amount of material to be hauled, the size of the truck and the length of haul will all, of course, have an influence on the distance per year which a truck will travel.

Depreciation, interest and repairs are all more or less independent of the number of miles which the truck travels per year, and the greater the number of miles traveled or the greater the amount of material hauled, the less will be the cost per mile run or per ton hauled for these items.

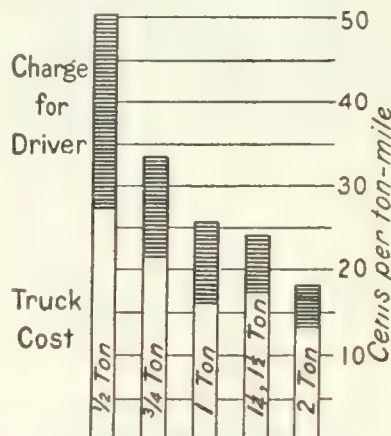
### Average First Costs

The average distance traveled per year is 3820 miles. About 10 per cent of the trucks traveled 1250 miles or less; about 43 per cent traveled 1251 to 3250 miles; about 29 per cent traveled 3251 to 5250 miles; about 9 per cent traveled 5251 to 7250 miles, and about 9 per cent traveled 7251 miles or over.

On the average truck farmers use their machines 160 days in the year; dairy farmers, 244 days; fruit farmers, 159 days; crop farmers, 127 days, and general farmers, 162 days. The dairy farmers thus use their trucks the most and crop farmers the least.

The average first cost of the trucks of

different sizes, including extra equipment, was \$600 for the ½-ton truck, \$1,306 for the ¾-ton, \$959 for the 1-ton, \$1,842 for the 1¼- and 1½-ton, and \$2,465 for the 2-ton truck. While the investigation included trucks ranging from ½ to 5-ton capacity, only about 2 per cent of these trucks were rated at more than 2 tons.



The above chart illustrates the cost per ton-mile of hauling crops with trucks of different sizes. Note the steadily decreasing cost with the increase in the size of the truck

Often the quoted price of a truck does not include some equipment which it is necessary or desirable to have. Nearly 75 per cent of the truck operators on whose experience this investigation is based had purchased some such equipment. This varied from minor attachments costing \$2 or \$3, to cabs and bodies costing as much as \$200 or \$300. Seven of these men had also purchased trailers for use with their trucks, but the cost of these is not included in the above figures.

It must also be remembered that over 1/3 of these trucks were purchased in 1917 or earlier and on that account the average first cost of the different sizes as given above is somewhat lower than the present (1921) prices of trucks of similar quality.

### Average Life of Trucks

The average life of all these trucks, as estimated by the owners, is 6.7 years. The estimated life of a ½-ton truck is 6.6 years, that of a ¾-ton truck 7.1 years, that of the 1-ton truck 6.3 years, that of the 1¼- and 1½-ton trucks, 7.2

years, and the life of the 2-ton truck 7.9 years.

The estimate of the life of a truck depends not only upon the probable amount of work which it will do and the care which it will receive, but also upon the owner's idea as to when it will be cheaper to discard the truck and purchase a new one rather than to spend more time and money on it for repairs.

There is a wide variation in the individual estimates on this item, but the investigators believe that the averages will give the prospective purchaser a fairly definite idea of the amount of service which he may expect from a truck.

In using these averages, however, the truck operator should remember that mileage is a far better basis than time for estimating truck life, owing to the wide variation in the number of days per year on which trucks are used by different operators.

### The Depreciation Item

Following the investigation results further, the average first costs of the trucks of different sizes, divided by the average life, gives an annual depreciation of \$91 for the ½-ton truck, \$184 for the ¾-ton truck, \$152 for the 1-ton truck, \$256 for the 1¼- and 1½-ton trucks, and \$312 for the 2-ton truck.

The annual depreciation, divided by the average number of miles traveled per year, gives the depreciation charge per mile of travel of 2.4 cents for the ½-ton truck, 4.2 cents for the ¾-ton truck, 4.1 cents for the 1-ton truck, 8.3 cents for the 1¼- and 1½-ton trucks, and 7.7 cents for the 2-ton truck.

The depreciation per year and per mile will vary greatly for individual trucks, but these average figures indicate the importance of this item. For each size the depreciation charge as here given is greater than the combined costs of fuel and oil. And for the larger sizes it is greater than the combined costs of fuel, oil and tires.

### Wide Variation in Repairs

The repair costs vary greatly with individual trucks, but the figures obtained by this investigation not only give prospective purchasers at least an idea as to what to expect, but also enable those already operating trucks to estimate whether or not their repair costs seem excessive when checked by this standard.



Repairs will ordinarily, of course, be low for the first year or two of the truck's life. Some 40 per cent of the operators who had owned their trucks 12 months or less had spent nothing for repairs. For no size of truck had the repairs for machines which had been in use less than a year cost more than \$20 on the average. On the other hand, very few operators who had owned their trucks for more than a year had been free from expense for repairs.

About 100 operators who had owned their trucks more than 3 years reported their repairs. The average age of these older trucks was not far from 4 years and the average annual repair costs to date for the  $\frac{1}{2}$ -ton truck has been about \$35; for the  $\frac{3}{4}$ -ton truck, about \$50; for the 1-ton truck, about \$40; for the  $1\frac{1}{4}$ - and  $1\frac{1}{2}$ -ton trucks, about \$35; and for the 2-ton truck, over \$100.

It is apparent, however, that these figures are too low for the average annual repair cost for the entire life of the vehicle. Judging by the results of the investigation, and based on present prices, a fair average for the repair costs covering the entire life of the vehicles, would probably be something like \$50 per year for the  $\frac{1}{2}$ -ton truck, \$75 for the  $\frac{3}{4}$ -ton truck, \$75 for the 1-ton truck, \$100 for the  $1\frac{1}{4}$ - and  $1\frac{1}{2}$ -ton trucks, and \$150 for the 2-ton trucks.

### Gasoline and Oil Costs

The average number of miles per gallon of gasoline obtained by men who own trucks of different sizes is about 5 miles for the  $\frac{1}{2}$ -ton truck, 12 miles for the  $\frac{3}{4}$ -ton truck, 11 miles for the 1-ton truck, 9 $\frac{1}{2}$  miles for the  $1\frac{1}{4}$ - and  $1\frac{1}{2}$ -ton trucks, and 8 miles for the 2-ton truck.

The average number of miles per quart of lubricating oil, according to the investigation, is about 60 for the  $\frac{1}{2}$ - and  $\frac{3}{4}$ -ton trucks, about 50 for the 1-,  $1\frac{1}{4}$ - and  $1\frac{1}{2}$ -ton trucks, and about 40 for the 2-ton truck.

These operators were paying an average of 27 cents per gallon for gasoline and 65 cents per gallon for oil at the time the investigation was made. On this basis, the total cost per mile for gasoline and lubricating oil was as follows: for the  $\frac{1}{2}$ -ton truck 2.1 cents, for the  $\frac{3}{4}$ -ton truck 2.5 cents, for the 1-ton truck 3.7 cents, for the  $1\frac{1}{4}$ - and  $1\frac{1}{2}$ -ton trucks 3.1 cents, and for the 2-ton trucks 3.8 cents.

### Figures on Tire Cost

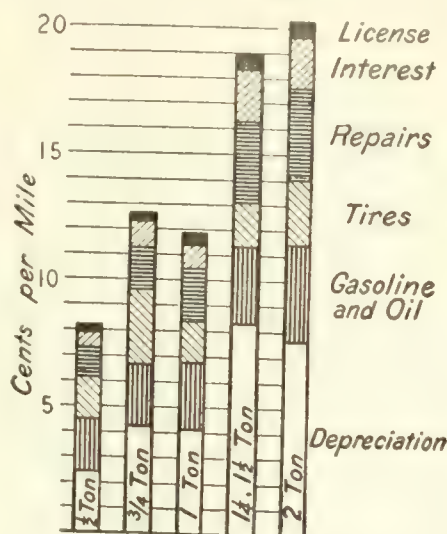
According to the estimate of these truck owners, the average cost per mile of tires, after making allowance for the wear with which the trucks were equipped when purchased and not including a charge for inner tubes or pneumatic valves, is 1.6 cents for the pneumatic tires on  $\frac{1}{2}$ -ton trucks, 2.9 cents for pneumatics on  $\frac{3}{4}$ -ton trucks, 1.6 cents for pneumatics on 1-ton trucks, 1.3 cents for solid tires on 1-ton trucks, 1.7 cents for solid tires on the  $1\frac{1}{4}$ - and  $1\frac{1}{2}$ -ton trucks, and 2.5 cents for solids on 2-ton trucks. A large percentage of the 1-ton trucks are equipped with smaller tires than

those used on many of the  $\frac{3}{4}$ -ton trucks. This is why the average tire cost for the 1-ton truck is lower than that for the  $\frac{3}{4}$ -ton truck.

The estimates made by 318 operators show that pneumatic tires on these trucks run an average of 4500 miles. The estimates of 206 operators show that solid tires run an average of 8200 miles.

### Average Cost per Mile

The average cost per mile of operating the trucks of different sizes, including charges for depreciation, repairs, interest on investment, registration and license fees, gasoline, oil, and tires, is 8.2 cents for the  $\frac{1}{2}$ -ton truck, 12.7 cents for the  $\frac{3}{4}$ -ton truck, 11.9 cents for the 1-ton truck, 19 cents for the  $1\frac{1}{4}$ - and



An interesting chart, showing the cost per mile of operating trucks of different sizes in farm work. Note that the mile cost is the opposite of the ton-mile cost, as shown in the other chart.

$1\frac{1}{2}$ -ton trucks, and 20.3 cents for the 2-ton truck.

Interest has been calculated at 6 per cent on the average investment, such average investment being determined by the following rule: First cost multiplied by years of service plus 1, and this result divided by the years of service multiplied by 2.

These costs do not include charges for taxes, garaging, insurance, labor of the owners in caring for and repairing the trucks, grease, and inner tubes for pneumatic tires. However, the investigation showed that in this particular field these items ordinarily amount to only a small percentage of the total cost.

### The Cost of Hauling

The cost of hauling with a truck is determined by the cost of operating the truck, including the charge for the driver's time and labor, the size of the load hauled, and the percentage of time during which the truck runs without a load.

The average time required for hauling, including the time taken for loading and unloading the truck, as obtained

from the figures given by these truck operators, is 0.14 hour per mile of travel for the  $\frac{1}{2}$ - and  $\frac{3}{4}$ -ton trucks, and 0.15 hour for the 1-ton and larger trucks. Under present conditions 50 cents per hour is probably a fair rate for the driver's time while actually at work.

These operators have return loads for their trucks about 26 per cent of the time. That is, on the average the trucks haul loads both ways on 26 out of every 100 round trips and run without loads on 74 one-way trips. The cost of operating the trucks and the value of the driver's time for these 74 trips without loads must be charged against the 126 trips with loads in order to obtain the actual cost per mile of haul.

The average load of crops hauled with a  $\frac{1}{2}$ -ton truck weighs 0.48 ton, with the  $\frac{3}{4}$ -ton trucks 0.93 ton, with the 1-ton truck 1.2 tons, with the  $1\frac{1}{4}$ - and  $1\frac{1}{2}$ -ton trucks 1.73 tons, and with the 2-ton truck 2.46 tons.

On this basis, 50.2 cents is the average cost per ton-mile of hauling crops with the  $\frac{1}{2}$ -ton truck, 33.8 cents with the  $\frac{3}{4}$ -ton truck, 25.8 cents with the 1-ton truck, 24.2 cents with the  $1\frac{1}{4}$ - and  $1\frac{1}{2}$ -ton trucks, and 17.9 cents with the 2-ton trucks.

It is of particular interest to note from the above figures, that the haulage cost per ton-mile decreases radically with the increasing size of the truck used. Thus, while the operating cost of a 2-ton truck per mile is about 20 cents as compared to about 8 cents for the  $\frac{3}{4}$ -ton truck, the ton-mile cost of hauling for the  $\frac{3}{4}$ -ton truck is three times the cost of the ton-mile haul with the 2-ton truck (50 cents as compared with 17 cents).

### Type of Tires Used

While it is not directly connected with the question of costs, the experience and opinions of these operators on the question of types of tires selected are especially valuable to other fleet owners and to prospective purchasers of trucks.

The investigation showed that 36 per cent of these Eastern truck owners used pneumatic tires, 33 per cent used solids and 31 per cent used pneumatics in the front and solids in the rear. However, experience has convinced 50 per cent of these operators that pneumatics are best for farm conditions, 41 per cent that solids are best and 9 per cent that pneumatics in front and solids in the rear are best.

The type of tire which one of these operators prefers depends largely upon the size of the truck he operates. Exactly 85 per cent of the owners of  $\frac{1}{2}$ - and  $\frac{3}{4}$ -ton trucks believe that pneumatics are best. The owners of 1-ton trucks are about evenly divided in their preference. And over 80 per cent of the owners of trucks larger than 1-ton believe that solids are best.

The choice of tire for any particular truck will, of course, depend not only upon the size of the truck but also upon the character of the material to be hauled with it, the amount of hauling to be done, and the kinds of roads on which the truck is to operate.



# How California Regulates Truck Traffic

## Up-to-Date Methods in an Up-to-Date State

By Roy H. Compton

THE State of California leads the rest of the country in many branches of truck transportation. And the regulation of this traffic is no exception.

Due to the rapid increase in the number of motor vehicles under its jurisdiction, the Railroad Commission of the State of California has organized a separate department for the control of motor traffic. This department, under the leadership of Charles E. Beck, functions exclusively in connection with details affecting highway transportation.

One of the most important results of the inauguration of this department—and one much appreciated by the transportation lines—is the speeding up of action in passing upon applications, transfers, complaints and petty details which formerly had to wait upon the time and convenience of the commission as a whole for action.

### Some of the Business Handled

According to the records of the commission, there were operating in the state during 1920 approximately 790 motor vehicle transport lines, carrying freight, passengers, express and baggage. This number includes also certain specialized carriers who handle only milk, eggs or perishable fruit and vegetables. It would be impossible to determine the exact number of vehicles engaged in this enterprise at any specified time, owing to constant changes and the fact that all of the operators do not keep accurate records. But there are 64 companies in this business and reports available indicate that the average is approximately 10 trucks each, or a total of about 650.

The longest motor transport route now in operation in California is that of the the Pickwick Stages, which are engaged in passenger and baggage transportation only. These lines operate on definite schedules between San Diego and San Francisco, a distance of approximately 600 miles. In the summer months these lines operate also from San Francisco to Portland, Oregon.

The Motor Transit Co., of Los Angeles, has lines radiating from Los Angeles as far north as Bakersfield, east to San Bernardino and south to San Diego, covering practically all intermediate points with short haul lines and probably covering the greatest total mileage.

Although the commission's records show only about 650 vehicles in operation, a report presented at the last session of the state legislature stated that there were 1069 vehicles operating as common carriers and therefore under the jurisdiction of the commission.

### Rates Decided by Commission

The common carrier freight lines are today handling approximately 200,000 tons annually. Reports obtained in 1920 from twenty-six companies show that the total was 170,080 tons. There has been a big increase in the tonnage carried since last year. New lines have been established and many of the old lines have installed additional equipment.

The matter of rates is decided upon by the commission. When a new company seeks to start in operation, it files with the railroad commission a proposed schedule of rates covering its service. This schedule is compiled by the operator and if accepted by the commission, cannot be increased thereafter, without a showing, before the commission, that the proposed increase is justified. Moreover, the schedules are always open to complaint, just like the rates of any other public utility subject to the jurisdiction of the commission, either by complaint of shippers or through action by the commission on its own initiative.

### Terminals Not Essential

There are no specific requirements as to termini, other than that operators must start from a designated point, as stated in their time tables, and carry passengers or freight to the terminal point assigned to the particular route which they serve.

All operators must, however, carry liability insurance covering person and property.

In making application to the commission for a certificate of public convenience and necessity to operate an automobile passenger or freight line, it is incumbent upon the applicant for such a certificate to make an affirmative showing before the commission that a public necessity exists for the proposed service and that the existing lines, if any, do not adequately care for the demands made upon them.

The commission also goes into the financial responsibilities of the applicant and makes inquiries as to whether he intends to engage in the operations of

the line on a permanent basis. This is done in order to make sure that the line, if established, would be a reliable and dependable means of transportation over the route proposed.

### Difficult to Obtain Data

The commission has experienced considerable difficulty in obtaining accurate data on the investments, revenues, and expenses of the various lines operating in the State. A uniform system of accounts for this class of service is now being compiled and under it, it is believed more positive information will be obtainable. At present, according to the commission, many of the smaller lines do not keep any record at all of their receipts and expenditures. From eighty-nine companies whose revenues for 1920 exceeded \$20,000 each, the following information has been obtained:

Total revenues..... \$7,311,322.80

Total expenses..... 7,384,857.54

After charging off depreciation twenty-eight companies report losses aggregating \$427,084.88. Sixty-one companies, also after charging off depreciation, report profits of \$353,550.14. The commission maintains that the losses reported cannot be regarded as accurate in view of the fact that, in checking over the statements, several companies have been found to have made an unreasonable charge for depreciation. In some instances the charge has been as high as 75 to 100 per cent of the total investment.

### Benefits of This Control

Undoubtedly there is a very promising future, throughout the State, for this class of enterprise. Originally the various services could not be regarded as wholly efficient. But the commission has tightened its control to such an extent that today passengers traveling by stage and shippers patronizing the motor freight lines are assured of first-class service at cheaper than railroad rates. More than 6,000,000 passengers were transported in 1920, the year referred to in all the above figures.

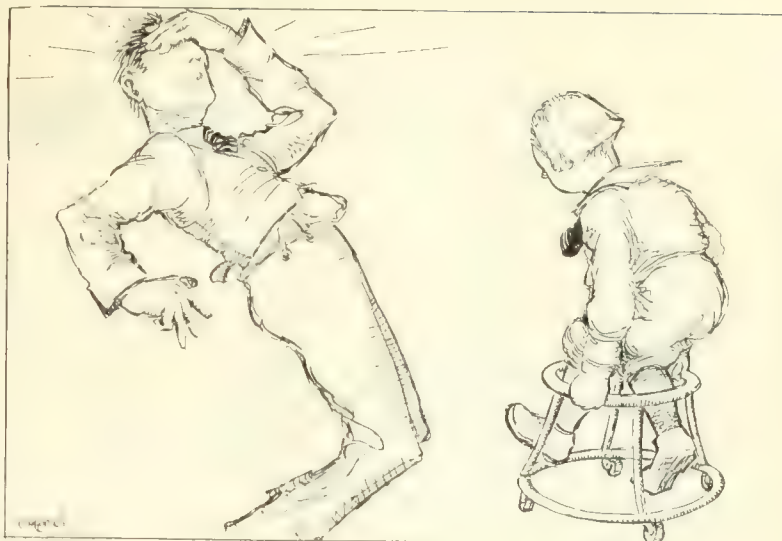
One of the chief benefits derived from motor transport under the commission has been in the development of many thriving communities which are entire without railroad facilities.

On the other hand, in some localities motor transport has proved so much more popular, both for freight and for passenger service, that the railroad lines have discontinued operation.



# Do You Need This Support?

By  
Sinclair Gluck



SILAS GUNTHER, president of the big commercial house, or Old Hammerhead, as his men called him, swung round in his chair to face his visitor.

"Glad to see you, Barron," he said. "Come over here and sit down."

The young assistant garage superintendent slid into the seat indicated and the old man leaned back and looked him over for a moment or two. Then he smiled suddenly. "Well, young man, you look a lot more contented than the last time we had a talk. Not worrying so much nowadays, eh?"

Barron laughed. "No, sir, thanks to that raise you gave me, things are going smoother at home now. I can't tell you how—"

The old man held up his hand. "Stop right there, young man. I gave you nothing. You earned a raise and you got it. That's all. Except this: every time you earn another, you'll get that, too." Barron nodded soberly. "I know that, sir. We all know it. And that's why—"

"Yes, I know," the old man interrupted. "Now," he went on seriously, "I asked you to come up here today because I believe that there is a little matter in which I can help you to get a straighter and more practical vision. And straight and practical vision is good for you and good for the firm, too."

The old man broke off, pressed the tips of his fingers together and gazed at the ceiling for a moment. Then he suddenly turned back to his young employee. "Barron," he began, "I dropped into Ross's office day before yesterday. You were in there talking to him. What were you talking about, do you remember?"

The young fellow hesitated a moment. "Why, I—I think we were talking about the tire record, sir. I had a new idea for keeping tabs on used tires which had come in for repairs and I went in to see what he thought of it."

Old Hammerhead nodded. "Let's see. You're in charge of those records, aren't you, Barron?"

"Yes, he's given me charge of those as well as the time records and the mechanics' supplies."

"Good," said the old man. "Then last week one day I dropped in to see Ross and found you in there talking to him. What were you talking about then, do you remember?"

Barron began to look a little puzzled and a little uneasy also. "Why, I—I'm not quite sure, sir. But I think it was about letting one of the mechanics on the night shift change to the day shift on account of his wife being sick."

The old man nodded. "Let's see. You're in charge of the mechanics now also; isn't that right?"

"Yes, sir," answered Barron uneasily. "But I thought—you see—"

Old Hammerhead nodded again. "That's all right, Barron. There's no particular harm in discussing these things with Ross. Now and then you're bound to run up against something you're not sure about and that's what Ross is there for."

"But," the old man went on, "I wonder whether you do a little too much of it, Barron? You see, each time that I've been down there, I've happened to find you consulting Ross. And that seemed to me a pretty fair indication that perhaps you consulted him a good many times when I did not happen to be there."

"Now there's no real harm in getting help on these things, as I said. Not at first, anyway. But it can be overdone, Barron. It can be kept up too long. And then there is harm in it."

"You see, those two things you consulted Ross about were both things about which you had the ability and the authority to decide for yourself. And that, Barron, is what *you're* there for, do you see?"

"When a fellow is first starting out in a new job, he's apt to ask a good many questions of the people over him, even if he is pretty sure of what the answer should be. He does that because he's nervous and anxious to do the right thing and he does not quite trust his own judgment yet."

"But if he does not watch out, Barron, he's apt to develop a pretty bad habit that way. You see, it's so much easier to let some one else decide for you. For

one thing, it takes all the responsibility off your shoulders. And for another it saves the mental effort of making the decision for yourself. But letting others make decisions for you is a bad habit in many ways, Barron. In the first place, it retards your own development. For development comes quicker with responsibility than without it. And in the second place it decreases your value to the firm. Because the greatest value a man can have, in an executive position, is the ability and the willingness to make decisions and take responsibilities."

The old man hesitated for a moment and then he smiled suddenly. "Barron, I understand that you've got a little boy up at your house. Is that right?"

Barron smiled. "Yes, sir. He's eight months old."

"I see. Not trying to walk yet, of course. But he will, Barron. Pretty soon he'll begin to toddle. And then you'll have to get busy and either walk with him or buy him one of these—'walking chairs,' I think they call them. Anyhow, he'll require a certain amount of support and a certain amount of looking after, until he gets on his feet—until he begins to feel firm on his feet, Barron."

The old man leaned forward in his chair. "But if your youngster used his chair for two or three months, you'd think it was about time to take it away from him, at least now and then, and see whether he could walk without it. And if he couldn't walk without it, after a good long time, why, you'd begin to get worried about him, wouldn't you, Barron?"

The young man laughed a little. "Yes, sir, I guess I would."

"Well, Barron, that's just the way I feel. I think that a young fellow undertaking a new position of responsibility requires a certain amount of support for a certain length of time. But after that time, if the young fellow can't get on by himself, without that support, I begin to get a little worried about him. Now the next time you feel like asking advice, think about that walking chair, will you?"

# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 602—Shallow Cuts in Piston Ring Stop Oil Pumping

THE method of fitting rings herewith illustrated has been found very successful. It is as follows: lay the piston ring on a flat surface and with a fine three-cornered file cut five or six fine grooves across the edge. These cuts should not be more than .003 in. deep.

In placing the ring on the piston be sure and put the groove edge down. This method will usually stop oil pumping and does not always involve the use of new rings to stop the trouble.

This treatment should be applied to all three rings. If there is a chance for a little compression to leak past the bottom ring seat it will tend to blow the oil down on the cylinder walls faster than the suction will bring it up. In other words, the top of the ring should have a better seat than the bottom in order to check the oil on the suction stroke and allow it to pass down on the explosion and compression strokes.

The slight loss in compression is nothing compared with the loss of power from foul spark plugs. This method has been tried out thoroughly under the worst conditions in the heart of the Rocky Mountains and has proved to be an effective and cheap method of stopping oil pumping.—W. SCARRAT, Denver, Colo.

## No. 603—Removing Shoulder at Valve Ports

TRUCK mechanics will find that repeated grindings and facings of valve seats will leave a shoulder on the cylinder casting, as shown in the accompanying illustration. This is due to the fact that the valve ports are too small to admit a cutter to face off the shoulders.

The use of a cape chisel to chip away the casting will remove the shoulder. But before starting this operation, the mechanic should be sure to place a rag over the cylinder opening, in order to prevent chips from getting in the cylinder.—W. A. KRAUS, Economy Grocery Co., Waterbury, Conn.

## No. 604—Refitting New Connecting Rod Bearings

WHEN refitting new connecting rod bearings, every mechanic knows what a tiresome job it is to "get out and get under" to insure a perfect fit.

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

The accompanying sketch shows a good way in which to accomplish this work without the usual fuss and waste of time. All that is needed is a vise and a mandrel. The latter should be the same size as the crankshaft pin.

The bearing should then be scraped to perfect fit. The caps are next tightened and the bearing burnished.

This mandrel may also be used to square up the piston before putting it in the engine.—W. A. KRAUS, Economy Grocery Co., Waterbury, Conn.

## No. 605—Making Use of Old Emery Wheel

AN old emery wheel can be made very useful by making a piece of stock to fit in the hole of the emery wheel and threaded on each side of the wheel. A nut placed on each side will hold the emery wheel stationary.

After this has been done, place the wheel and stock into the chuck of drill press. This can then be used to file rivets and other stubborn parts that cannot otherwise be taken off the chassis or other places.—CHARLES BOEHME, Gobel's Garage, Brooklyn, N. Y.

## No. 606—Drilling Small Holes in Sheet Metal

DIFFICULTY is often experienced in punching small holes in sheet metal. The work can be more easily accomplished by using a steel block with a hole drilled in it the size of holes required. Use a piece of round steel for a punch. A drill press will then come in handy for forcing the punch into the hole, as shown in the sketch.—N. S. BEEBE, Beebe Storage and Moving Co., Kansas City, Mo.

## No. 607—Ford Radius Rod as Lifting Hook

A HOOK for the hoist or overhead pulley, used as a means of raising one end of a light delivery car, can be improvised from a Ford radius rod, as is shown in the accompanying illustration.

The ends of the rod, which are the connections for the front axle, are bent outward. When these are slipped under the spring hangers at either the front or rear, the hoist connection is made at the ball end of the rod. This lifter is strong, quickly applied, and as serviceable as one made especially for this purpose.—W. T. TODD, Chicago.

## No. 608—Front Axle Liner for All Sizes

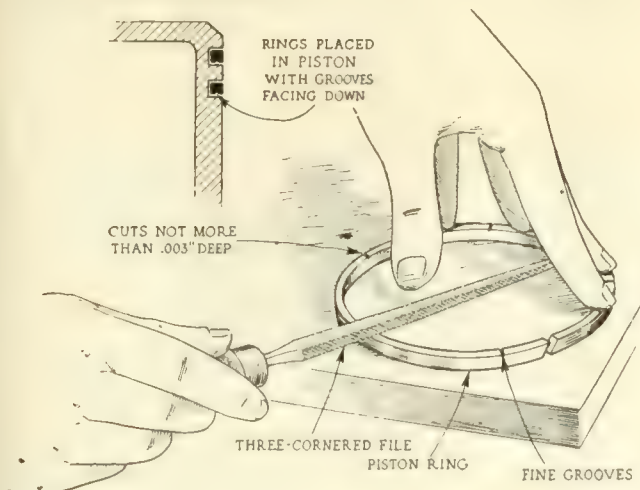
HERE is a liner that can be applied to any size of axle. The cones guide themselves to the center of the hole. The top cone is adjustable and held in place with a set screw.—F. A. PEARSON, New York City.

## Buses for Lansing

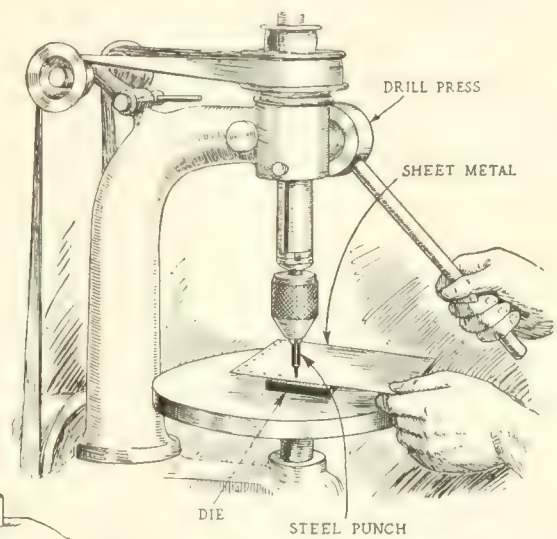
LANSING, MICH., Oct. 17—The Reo Motor Car Co. has given its sanction to a plan of its retail dealer in this city, whereby it is hoped to overcome the opposition of the city council to bus operation. With the way cleared to buses, there would be opened a new avenue to sales which promises at the outset ten to fifteen buses on one route alone.

The dealer has obtained from the council permission to operate a bus on a route not conflicting with street car service, for a 30-day period. Fares will be the same as railway rates and careful record will be kept of income and operating expense. At the end of the month results are expected to show the council the advisability of the additional transportation service.

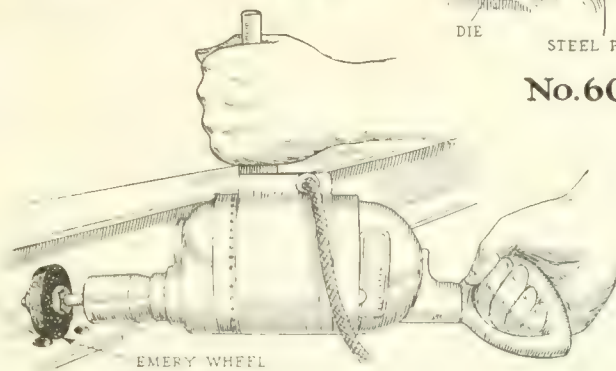




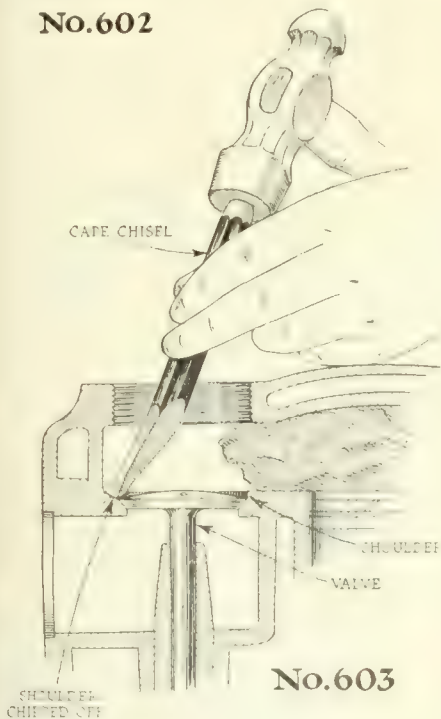
No.602



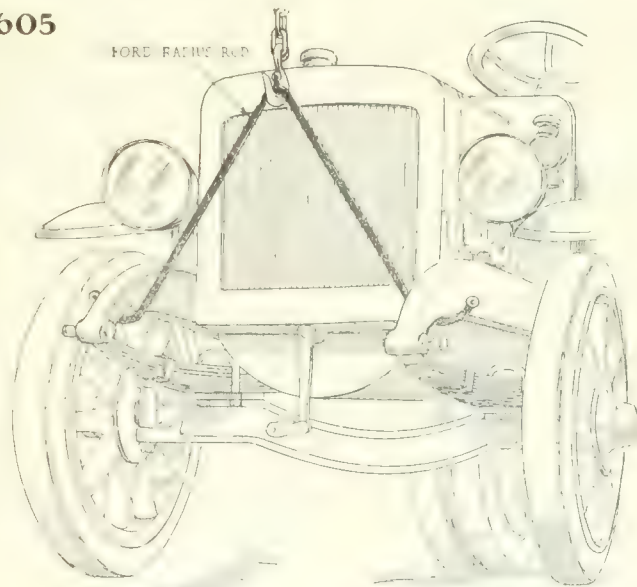
No.606



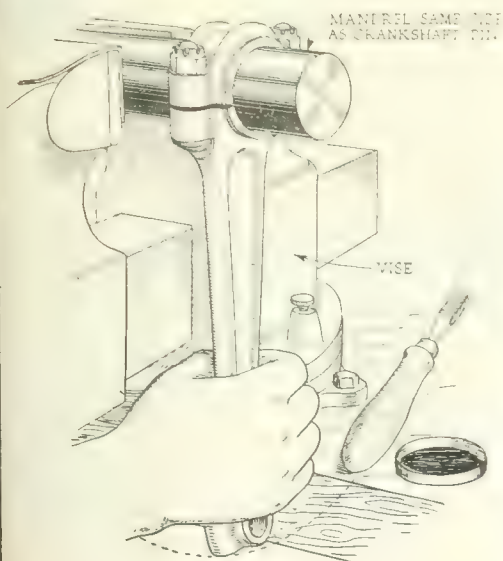
No.605



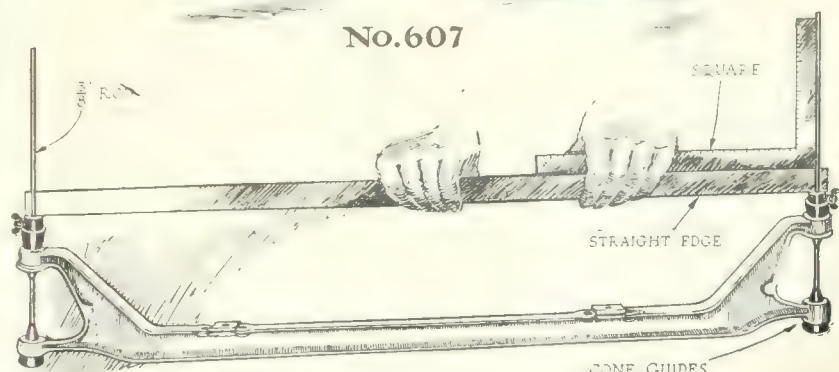
No.603



No.607



No.604



No.608

### No. 609—Lengthening Life of File

**R**UBBING chalk on a file will lengthen the life of the file and will also bring about smoother work. Chalk also keeps the chips from sticking.—N. S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

### No. 610—Keeping Hammer on Handle

**A** HAMMER which is liable to fly off the handle might do some serious damage. A good and simple way to fasten it securely is with a wood screw. This should be screwed in as shown in the accompanying sketch, when it will act as a wedge.

Another good way to prevent accidents is to sharpen a washer on one side and then drive it in the head. After this has been done, the wood will swell into the hole, thus preventing the wedge working out.—A. STAHL, New York City.

### No. 611—Washing Soda for Cleaning Parts

**I**N these days of high priced gasoline, it is not very economical to clean truck parts to make use of this fuel. Ordinary washing soda dissolved in hot water and poured over the parts to be cleaned will do the job as quickly as gasoline. The parts will dry without rusting.

When gasoline or kerosene, however, are used, it will be found that by permitting the oil and other collections to settle, the oil may be used over and over again. The usual procedure is to equip the receptacle with a faucet from which the liquid may be run out.

When it is possible to get live steam, fleet owners usually use a spray or force the steam into a barrel into which the parts are dropped to be cleaned. When this is done, however, care must be taken that rust does not collect. It does not take long for the steam to loosen all dirt and oil collections and when this has been done, the parts should be thoroughly dried.—A. STAHL, New York City.

### No. 612—Convenient Place for Washers

**W**ASHERS are very unhandy when strung on a piece of wire. On the other hand, when they are put on pieces of stock which are inserted on a plank of 2 by 4, as shown in the accompanying sketch, they can be removed. The diameter of the stock should be a little smaller than the inside diameter of the holes in the washers. The pieces of stock are threaded so that they may be screwed clear through the plank and then bolted at the bottom.

This idea is also an excellent one for gears, etc. It is a time saver and should be used because of that fact.—J. BERGER, Gobel's Garage, Brooklyn, N. Y.

### No. 613—Getting Ford Bands in Place

**I**N relining the Ford bands difficulty is sometimes encountered in keeping all of the ends of the bands in their proper places. This difficulty is overcome by taking a tube 3 or 3½ in. (a discarded one) and cutting a band about 1 in. wide. This band is then stretched over the ends and then turned down so as to have a double thickness of rubber around the transmission bands.

A 3-in. tube that is new can be cut 2 in. wide and used. The older tubes are liable to stretch, hence they should be made double.—WILLIAM A. KRAUS, Economy Grocery Co., Waterbury, Conn.

### No. 614—Nut on Fender Bracket Eliminates Shake

**F**ORD fenders and other similar fenders are tightened down solidly by threading the end of the rod forming the bracket and placing on this thread a nut, as is shown in the accompanying illustration.

After the fender is put on the bracket and the hook bolt is inserted with which the fenders are held, a nut is placed over the thread on the rod bracket and pulled up solidly, forcing the fender against the side of the car or into a secure position on the rod. This modification does not interfere with the removal or replacement of fenders, but simply clamps them solidly.—E. GOODWIN, Chicago.

### No. 615—Making a Lead Hammer

**N**OT every mechanic is in possession of a lead hammer. He can make one by cutting out of brass or babbitt metal a round piece with wings which are bent over and fastened with wire to the hammer as shown in the sketch.—A. STAHL, New York City.

### No. 616—Garage Wall Bumper for Light Trucks

**T**HERE is sometimes a great need for bumpers along the wall space of a truck garage. The drivers will come in at night and because of poor lighting facilities to see behind the truck will smash into the wall, thus creating considerable damage. Some fleet owners have installed concrete bumpers that run out far enough from the wall to prevent the rear end of the truck or car from bumping into the wall.

The idea shown herewith is a good one and will serve well with light trucks. Two old springs of the cantilever type, connected at the shackle ends with a piece of lumber will make an excellent wall bumper. The springs can be connected to the wall with expansion bolts.—L. BUTCHER, Colfax, Iowa.

## Columbus Bus Business Growing Rapidly

COLUMBUS, OHIO, Oct. 18.—The motor bus business in Columbus and central Ohio is developing rapidly from a small start about the middle of the year. Previous to that time several buses were in operation on the streets of the Buckeye capital but they did not maintain any stated schedules and thus did not cut much figure in the scheme of transportation for the city. But recently developments have shown that there is a place for motor buses in Columbus, although the street car system is fairly good.

The Ohio Motor Bus Co., which has offices at 30 North Water Street, was the first concern to undertake a definite and scheduled motor bus service. Three buses were placed in service connecting Columbus and Westerville, a village about 15 miles northeast of the city. These buses were successful from the start and it was not long before a line was placed in service on East Broad Street, connecting the business center with Bexley, a suburb. In all, four buses are used on this line and an 11-minute service is maintained. While at first the buses were not so successful, still in a short time they were pretty well filled up and the proposition is now a money maker.

The Columbus Coach Co. is the latest addition to the ranks of motor bus concerns. September 23 it started a 12-minute service on Bryden Road which has all of the indications of success. The route is about 3 miles long and covers streets not served by street car lines,

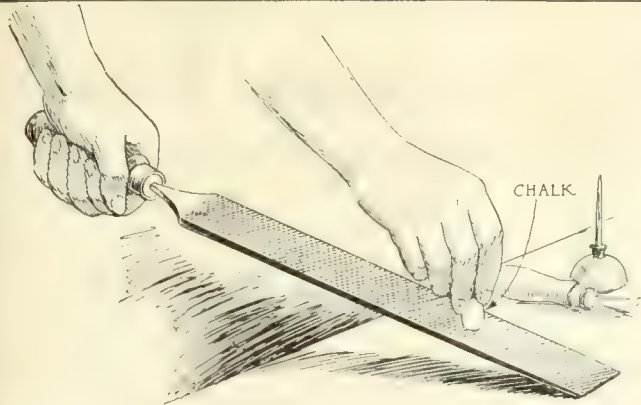
which is also true of the East Broad Street line.

The buses used by both the Ohio Motor Bus Co. and the Columbus Coach Co. are manufactured by the American Motor Truck Co. of Newark and are known as the "Ace." The bodies are made by the same concern but have been specially designed for use in the Buckeye capital. The bodies accommodate thirty passengers without crowding and have the entrance in front opposite the driver who collects the fares.

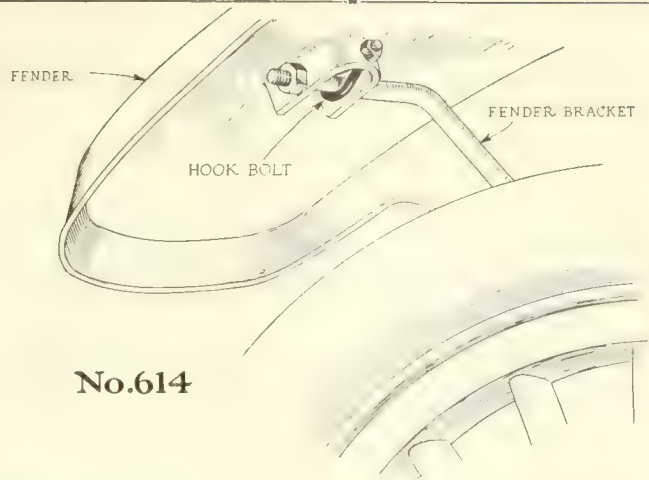
After a service of 6 weeks the four buses on East Broad Street were carrying at the rate of 60,000 per month, according to the officers of the company. The Westerville line, which charges 20 cents each way or 18 cents when tickets are bought, is somewhat cheaper than the traction line and is very popular. The fares on the East Broad Street line are 5 cents straight to Franklin Park and 10 cents to Bexley or intermediate points. The fare of the Bryden Road line is 5 cents straight.

I. C. Robinson is president and R. E. McCullom, general manager of the Ohio Motor Bus Co., while John B. Gager is general manager of the Columbus Coach Co., which is a partnership. These concerns maintain a large garage and service station at 564 East Mound Street, where the buses of the Ohio Motor Bus Co. are stored and looked after. Mr. Gager has worked up a system of keeping tab on each motor bus to ascertain its performance as to earnings and the cost of upkeep.

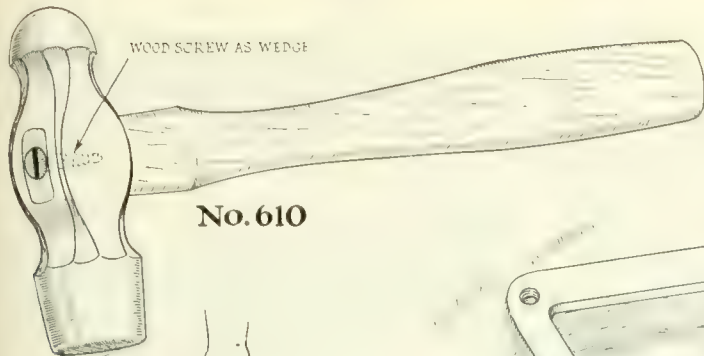




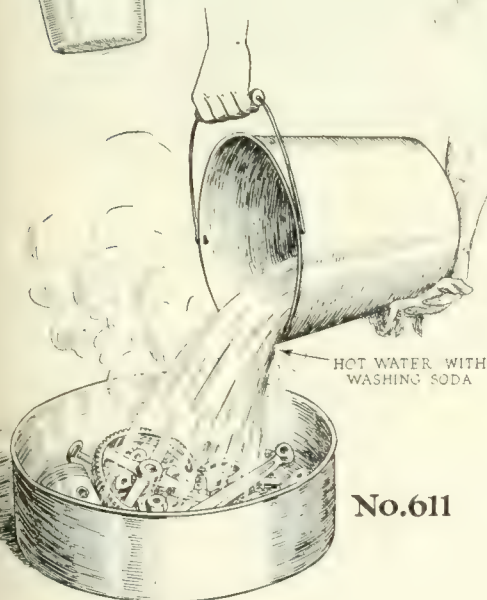
No. 609



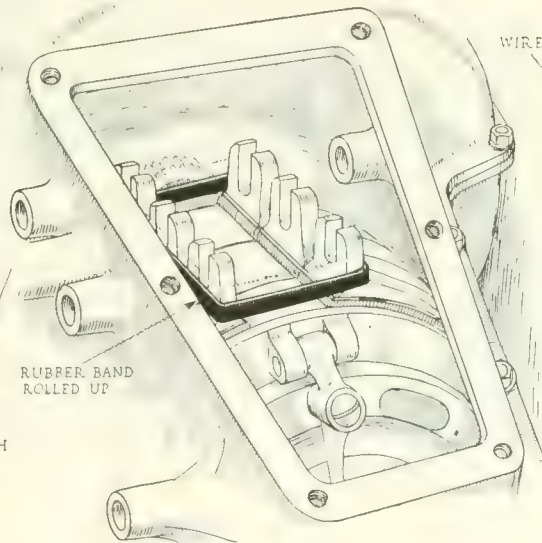
No. 614



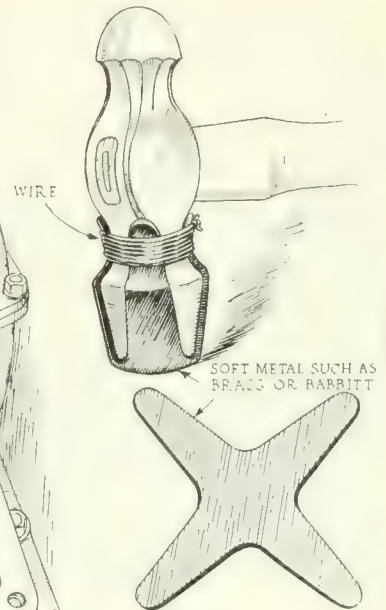
No. 610



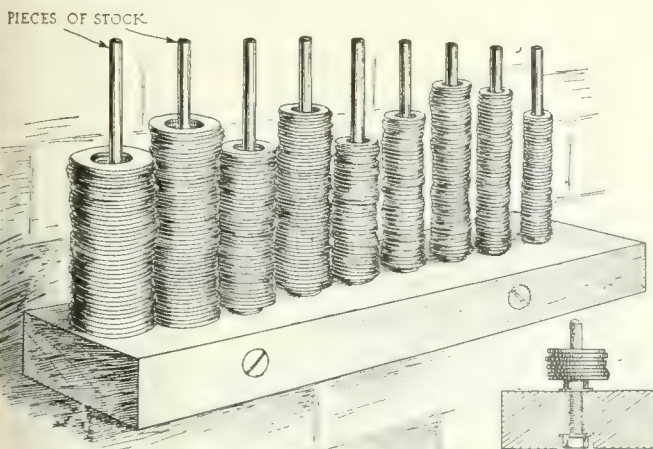
No. 611



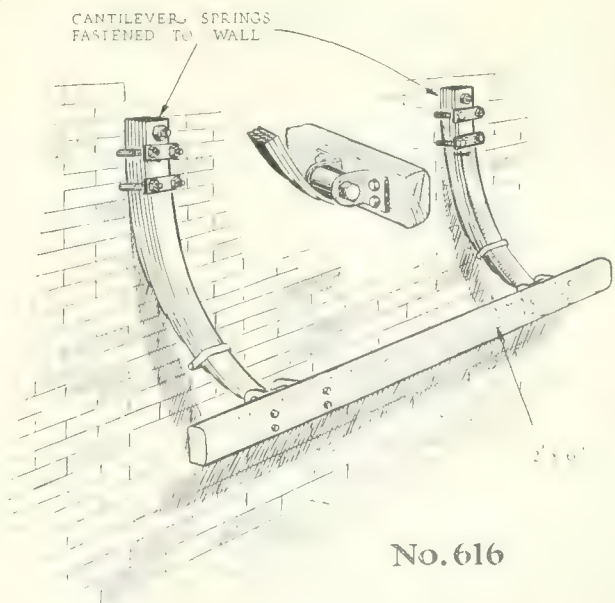
No. 613



No. 615



No. 612



No. 616

## Buyer's Department of The Commercial Vehicle

### New 3/4-Ton Stewart Has Larger Engine

*Other Changes Include Larger Tires  
and Gear Ratio*

#### STEWART SPECIFICATIONS

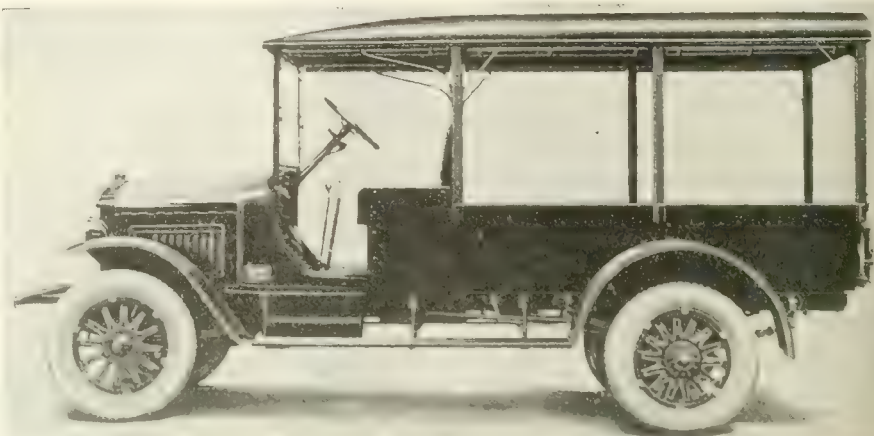
Capacity, tons.....	3 1/4
Price, chassis.....	\$1,395
Wheelbase, in.....	125
Tires, front.....	34 x 4 1/2
Tires, rear.....	34 x 4 1/2
Bore, in.....	3 3/8
Stroke, in.....	5 1/4
N. A. C. C. hp.....	21.08
Speed, m.p.h.....	45
Gear ratio in high gear.....	5.5 to 1
Final drive.....	Int. Gear

A NEW 3/4-ton speed truck, model 14, has been placed on the market by the Stewart Motor Corp., Buffalo, N. Y. This new model is assembled with a Buda model MU engine with removable cylinder head and block. This power plant has been designed especially for speed truck work.

The price of Model 14 is \$45 higher than the previous model 11. On the other hand, the new model is equipped with a larger engine and tires. The gear ratio on the older model was 6.6 to 1, compared with 5.5 for Model 14.

Remy ignition is used. Carburetion is accomplished by the new model Zenith carburetor, which is adjustable with hot-spot quick starting device. Fuel is fed by gravity from a 16-gal. tank located under the seat. Engine lubrication is taken care of by a full-force pressure feed to the crankshaft, camshaft bearings and connecting rod bearings. The Alemite pressure lubrication system is used for the chassis. Water is circulated by a centrifugal pump through a vertical tube type of radiator.

The clutch is of the dry-plate type with one set of steel plates and another set of steel disks lined with molded clutch facings. The engine, clutch and gearset are mounted as a unit. The shafts of the gearset are mounted on annular



*The new 3/4-ton Stewart speed truck*

ball bearings. The gear shifter fingers are made of .20 carbon steel, and are case hardened to prevent wear.

The rear axle is the Clark internal-gear driven type. The front axle is of the drop-forged type, 1 3/4 in. wide by 2 3/4 in. deep.

The steering gear is of the screw and nut type with an adjustment on the thrust bearings for removing any end motion of the screw that may develop.

The frame side rails are 4 1/2 in. deep and 2 1/4 in. wide. The thickness of the steel used is 3/16 in. There are three cross members, two of which are hot-riveted solidly in place.

The front springs are semi-elliptic, 41 by 2 in., and equipped with full length rebound plate. The entire spring is made of a special grade silico manganese alloy steel, heat-treated for flexibility, and

equipped with bronze bushings working on hardened steel pins. The rear spring is of the semi-elliptic type, 54 by 2 in. and equipped with full-length rebound plate. The rear springs also have bronze bushings.

Standard equipment includes electric head lights with legal lenses, electric tail light, tool box, 111-hr. Willard battery, tools, jack, horn, oil gage, fenders, running boards, and pneumatic cord tires.

Three standard body types are used with this model. These are open and covered express bodies and a panel type. In designing the express bodies, the seal has been made separate from the top thus enabling the owner to readily convert a covered express into an open express body with the addition of a cab which will interchange on the seat or either the open or covered express.

### New Traffic "Speedboy" Has 1 1/2-Ton Capacity

#### TRAFFIC SPECIFICATIONS

Capacity, tons.....	1 1/2
Price, chassis.....	\$1,195
Wheelbase, in.....	128
Tires, front.....	35 x 5
Tires, rear.....	35 x 5
Bore, in.....	3 3/8
Stroke, in.....	5
N. A. C. C. h.p.....	22.5
Speed, m.p.h.....	2000
Final drive.....	Int. Gear

THE designers of the new Traffic "Speedboy" built by the Traffic Motor Truck Corp., St. Louis, have paid

particular attention to time saving in the loading and unloading operations. With this in mind they have designed a body with large loading space and a low hung chassis. This makes a shorter lift in loading and unloading and provides room for maximum capacity loads of 3000 lb.

This new model is completely equipped, including Fisk pneumatic cord tires on heavy disk airplane type wood

wheels and electric lights and starter. The top is full length, 5 ft. from the floor, with roll-up curtains at side and rear ends with side drop curtains. The driver's cab is roomy and comfortable. The load area measures 8 ft. inside from the rear of seat, by 44 in. wide. The body is finished in Traffic standard red and white stripes and black trim.

The truck is assembled with standard units, including a Continental four



# Buyer's Department of The Commercial Vehicle

cylinder engine, Bosch magneto, Covert gearset, Gray & Davis starting and lighting system, Carter carburetor, Russell internal-gear rear axle, Timken roller bearings, and Detroit steel springs.

Standard equipment includes headlights complete with a single contact dimmer and head bulbs with non-glare lenses, tail-light, explosion whistle, full set of 16-gage roll fenders, running-board skirt, front splash, runningboard, speedometer, two-way ventilating metal windshield, seat and cowl, canopy top body and full set of tools.

The chassis weight is 3400 lb., while the road clearance is 12 in. The body specifications are as follows: panels 3/4-in. gum, 15 1/2 in. high, reinforced with oak rail at top; flares are of 3/4-in. clear oak, 6 in. wide, 45-deg. angle; the tailgate is dropped with a chain; the top is of the four-post type, stationary and extending the full length of the body and over dash; the roof covering is of No. 10 sail-duck painted; the posts are of close grain white ash; the cushion is of imitation leather with deep cushion springs, lazy-back full upholstered with springs. All the framing and floor of body is of the best quality oak; all tenoned joints set in glue and are doweled; all jointed surfaces of wood are set in white lead to prevent moisture entering; all ironing is hand forged and bolted with through bolts.

The powerplant is supported at three points. Lubrication is taken care of by a combination force feed and constant level splash system. A gear-driven

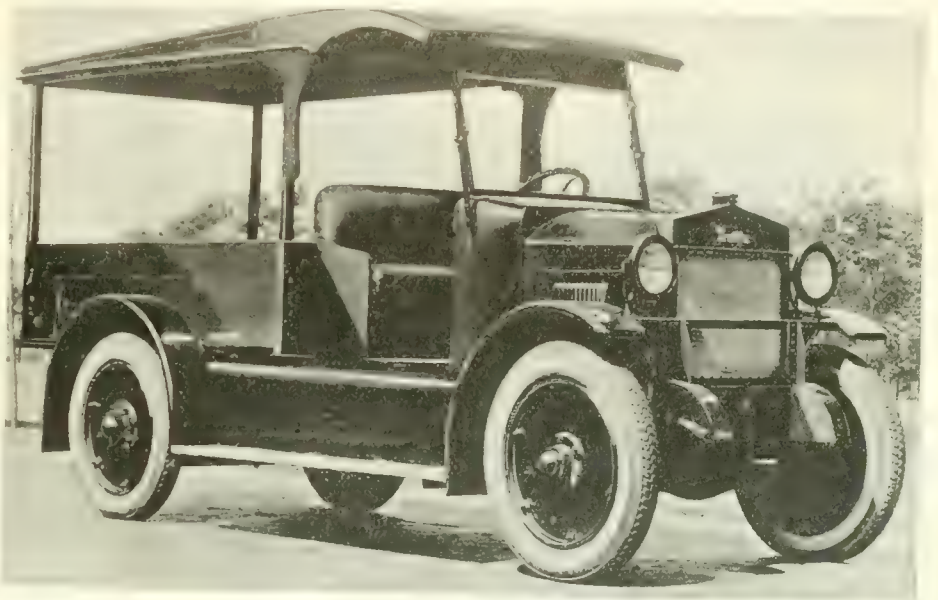
pump supplies the oil to the timing gears and main bearings. Other parts are lubricated by splash. Fuel is fed to the carburetor by gravity from a 12-gal. tank located on the dash. Water circulation is by thermo-syphon through a cellular type of radiator mounted on a 4-piece cast-iron shell.

The three-speed gearset is a unit with the powerplant. All gears are of 3 per cent nickel steel, heat-treated and ground. Extra large roller and ball bearings are used. The driveshaft is two-

piece with three universal joints. Alignment of the driveshaft is maintained by a self-aligning roller bearing which eliminates vibration, whipping and other distortion.

The frame is made of 6-in. U-channel structural steel, 177 1/4 in. long overall, with ends heavily bound and gusseted. The front axle is of I-beam construction with Timken roller bearings on the wheels. The brakes are internal and external.

Steering is on the left.



The new Traffic "Speedboy" is completely equipped

## Denby Now Marketing New 3/4-Ton Truck

THE new 3/4-ton Denby speed truck, Model 31, has just been placed on the market. Fuel economy, speed, and sturdiness are features claimed by the maker of this new model. The Denby Motor Truck Co. has been experimenting for some time with this truck and has only recently placed it on the market.

Well-known units are used in the assembly. These include a Detroit pressed

DENBY SPECIFICATIONS	
Capacity, tons	3/4
Price	\$1,625
Wheelbase, in.	130
Tires, front	35 x 5
Tires, rear	35 x 5
Bore, in.	3 1/2
Stroke, in.	5
N. A. C. C. hp.	19.6
Speed, r.p.m.	1900
Speed, m.p.h.	35
Final drive	Spiral Bevel

steel frame, Continental four-cylinder engine, Long radiator, Eisemann high-tension magneto, Remy starting and lighting, Stromberg carburetor, Fuller clutch and gearset, Sheldon front axle and Columbia spiral bevel rear axle, Detroit steel springs, Ross steering gear and Universal joints.

The greatest possible length and width of body that can be fitted on this new job is 10 by 5 ft.

The cylinders are cast in block, the valves being at the right. Water is circulated by thermo-syphon through a vertical finned tube type of radiator. The engine lubrication is taken care of by a splash-pressure system. Spark control is by hand. Fuel is fed by gravity from a tank located in the dash.

The three-speed selective gearset is a unit with the engine. The clutch is of the multiple dry-disk type.

The springs are semi-elliptic. Both propulsion and driving torque are taken through the rear springs. Both hand and foot brakes operate on the rear wheels, the former being internal and the latter external.



One of the new Denby 3/4-tonners recently placed in service



# Buyer's Department of The Commercial Vehicle

## Grey Goose Shock Absorbers

THESE are made in two types, one for the front Ford springs and one for the rear. The in-and-out action absorbs the shocks and prevents an excess up and down motion. This permits the spring itself to function in its natural way. The design is a curved leaf-spring of chrome vanadium steel. The eyes are bushed, reamed and drilled for oil cups. A set of four can be applied in about 30 minutes, it is claimed. No special tools are necessary and the job can be accomplished with raising or lowering the body. The price is \$10. The maker is the Indiana Parts Co., Richmond, Ind.

## Baf-Oil Plug

THIS plug is a combustion chamber into which the spark plug is screwed in the usual manner. In each chamber are two baffle plates which prevent the oil from reaching the firing points. Each plug is a unit in itself. A priming feature is included in the ½-in. size. These plugs are made in two sizes, the ½-in. standard selling at \$1 and the ¾-in. at \$1.25. The Gemco Mfg. Co., Milwaukee, Wis., has taken over the manufacture and sale of this product, formerly introduced by the Protectometer Co., Chicago.

## Hylo Bumper

THE four loop springs in this bumper are connected in the center by a rigid arch which, it is claimed by the manufacturer, greatly strengthens the bumper and prevents vibration. As the loop springs extend entirely across the front of the truck, they furnish a 6-in. impact surface, designed to fend off any protruding parts of other vehicles which might find their way above or beneath the ordinary 2-in. bumper. The wide impact surface also helps to distribute the force of the impact and absorb the shock with the least possible strain or noise. The maker is the Cox Brass Mfg. Co., Cleveland.

## Perfex Radiator for Fords

THIS has been designed along regular standard, heavy duty specifications and is strong enough to withstand the severe strain of Ford truck work. Specifications include 18-gage seamless drawn tanks, formed from one piece of material, eliminating seams and joints. The lower tank to which is bolted the patented spring bracket suspension, is heavily reinforced with 14-gage stampings, pressed in place, then riveted and soldered.

This radiator has 68 individual tubes, each of which is live and circulates water. A unique method is employed in making the tubes. Instead of drawing, pressing or stretching the core stock, the

## Truck Accessories

material is formed, shrinking the excess of stock. A special bronze of .005 in. thickness is used. The maker claims this material is not affected as much by alkali or lime water as is brass or copper.

The list price is \$26. The maker is the Perfex Radiator Co., Racine, Wis.

## "Truck-Grip" Chain

THESE anti-skid chains are snapped directly on to a steel ring, known as a retaining ring, that is fastened to the spokes by the use of hook bolts. The chains can be snapped on and taken off the ring in less than a minute.

The arrangement is such that entire flexibility is obtained as to the number of cross links used. In case one wheel encounters bad ground, all or part of the links from the opposite wheel may be snapped on to secure additional traction. The maker is the Truck-Grip Chain Co., 2 Columbus Circle, New York City.

## Aske Electric Vaporizer

THIS device is made up of enameled copper wire wound on a porcelain frame in such a way as to form four durable and non-clogging grids which are encased in a cover of Thermoplas, a high heat resisting compound of great mechanical strength. The whole, when placed between the carburetor and the intake manifold and charged by a carefully predetermined current of electricity, serves to heat the incoming mixture and thus make starting instantaneous, saving wear and tear on the starting battery.

The current does not flow through the wires continuously, but after the engine is started it is switched off and the criss-cross wires of the grid have the mechanical action of subdividing the fuel particles into a finely atomized state. The retail price is \$10, which includes all necessary equipment. The Horgan-MacDonell Co., 39 West Adams Street, Chicago, is distributor.

## Kingston Fuel Protector

THE three features of this device are that it provides a reserve supply of 1½ gal. of gasoline, it cleans the gasoline and it provides for shutting off the gasoline supply. It screws into the bottom of the gasoline tank in place of the standard trap. The rod extends from the protector to a point just outside the splash board of the truck and the end of this rod is fitted with a dial which reads "On, Off," and "Auxiliary." There is a small stopcock at the bottom of the sediment bulb for draining the tank.

The price is \$3.50. The maker is Byrne, Kingston & Co., Kokomo, Ind.

## Sharon "Brute" Trailer

THIS is specially designed for heavy duty service with tractors, in warehouses, terminals and transfer stations. The frame is made up of 4½-in. channel sections pressed from ½-in. hot rolled open-hearth steel, riveted into one-piece channel section corner pieces pressed to a 6-in. radius, with a hole for stake pocket. By varying the length of side and end rails, this trailer can be made in any length up to 72 in. and in any width up to 50 in. All frame members are flush on the bottom, thus affording an even support when the trailer is used in connection with a lift truck. The maker is the Sharon Pressed Steel Co., Sharon, Pa.

## K-E-M Terminals

THESE terminals make a clean, workmanlike job at the end of the cable. No tools are needed. To apply, pull wire through the hole in the socket, divide the strands, twist them around the tapered lug and put on the cap. They are furnished in 5, 7, 8 and 9 millimeter sizes for high and low tension. The maker is the K-E-M Co., Brooklyn, N. Y.

## New Hartford Shock Absorber

THE same basic principles are contained in the new model as were used in former types. However, in the new model a tubular drag link connects the arm of the shock absorber with the axle. Ball sockets at each end allow free side play. There is but one model which is quickly attachable to almost any passenger car or light truck, five different fittings being made to accomplish this end. One or two extra brackets are required for a few cars. The price per set of four is \$35. The maker is Edward V. Hartford, Inc., New York City.

## Goodyear Rut-Proof Tire

THE Goodyear rut-proof tire which is being placed on the market for motor trucks has the side wall materially strengthened and there is considerably more rubber of a better quality for the purpose at that point. These tires have undergone tests in the coal fields of Ohio where road conditions were severe during the fall, winter and spring months. Ruts running from 6 to 12 in. deep were found.

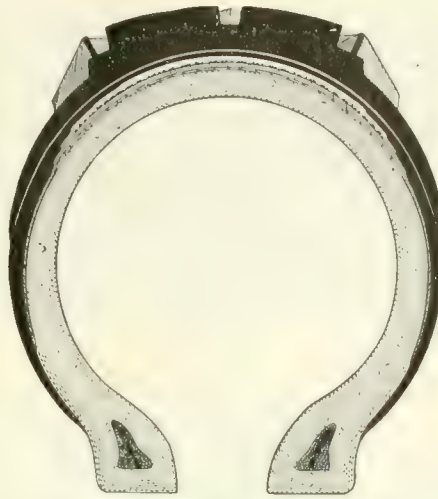
In addition to the increased strength of the side wall, the shoulder is strengthened and a semi-flat tread is provided. The 6, 7 and 8-in. sizes, these being double molded. The 9 and 10-in. sizes are double molded also, but have a full flat tread. The prices are as follows: 36 by 6, \$96.50; 38 by 7, \$134.70; and 40 by 8, \$173.45.



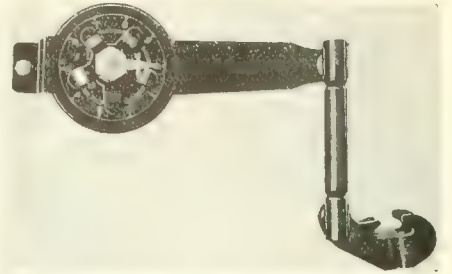
# Buyer's Department of The Commercial Vehicle



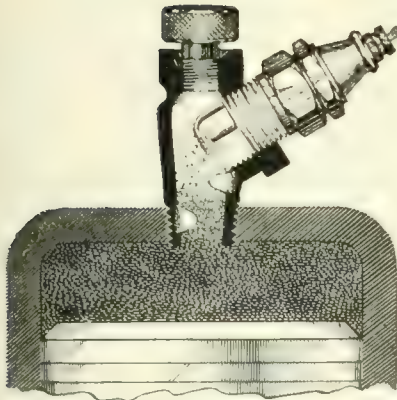
*Brute Trailer*



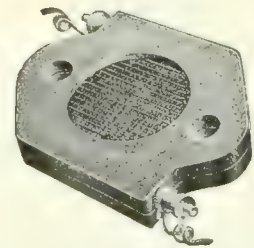
*Goodyear Rut-Proof Truck Tire*



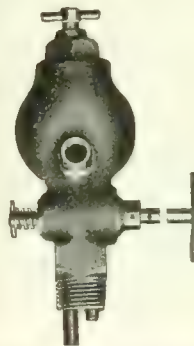
*Hartford Shock Absorber*



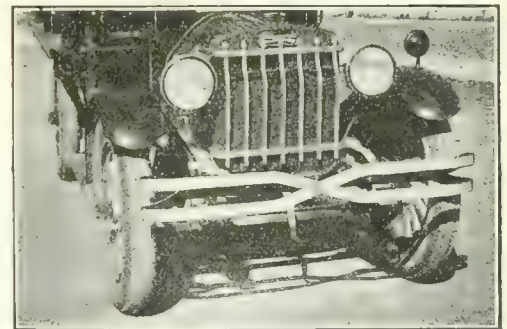
*Baf-Oil Plug*



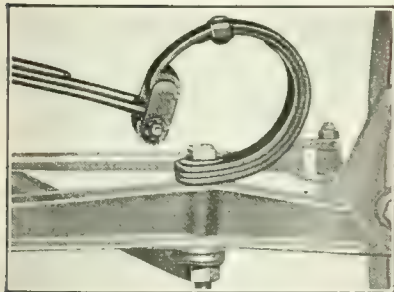
*Aske Vaporizer*



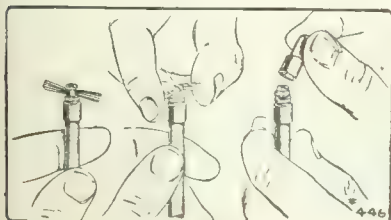
*Kingston Fuel Protector*



*Hylo Bumper*



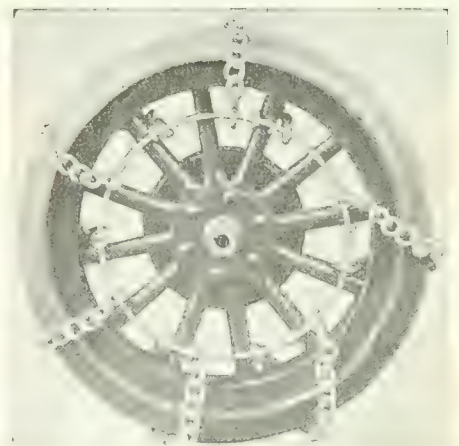
*Grey Goose Shock Absorber for Fords*



*K-E-M Terminals*



*Perfer Radiator*



*Truck-Grip Chain*



# Buyer's Department of The Commercial Vehicle

## Knowles Adjustable Creeper

**A** LEVER on this creeper raises or lowers the head rest to any desired position. An automatic 4-in. horizontal movement is also possible when the head rest is raised. The creeper is made long enough to accommodate the body of any mechanic and is wide enough to allow the free use of the arms under the truck. The action of the lever that adjusts the head rest is very easy and can be operated without effort while in a reclining position. The price is \$12.50 and the maker is the Knowles Adjustable Creeper, Minneapolis, Minn.

## Savidge Universal Valve Lathe

**T** HIS is a bench lathe for replacing valves. The crank attaches to the valve stem and the valve is held against the dead center by means of a spring. The tool is fed by means of a hand screw feed. The price of the lathe is \$15. The maker is the Eclipse Mfg. Co., Indianapolis, Ind.

## Sunnen Universal Valve Lifter

**T** HIS can be adjusted to fit any engine. The upper jaws can be adjusted to fit any valve spring seat and the lower jaws to rest on the push rod. The push rod guide, or in cases where the guide comes too close up to the spring, can be expanded to go over the guide and rest on the block. This gives sufficient room for removal of the pin. The lifter can be swung around in any position and will not slip out. The price is \$2. The maker is the Banner Accessory Mfg. Co., St. Louis, Mo.

## Hyrate Battery and Jar Gripper

**T** HE removal of an element from a battery jar almost invariably requires considerable force due to the expansion or buckling of the plates. The Hyrate equipment holds the battery and jar and renders pulling of the elements easy without danger of breakage. It is adjusted to fit any size of battery. The maker is the Service Station Supply Co., Detroit.

## Ransome Cylinder Reamer

**T** HIS parallel expansion reamer comprises only three units—body, nut and blades. Each reamer has 1/16-in. expansion extra to allow for regrinding. The blades are anchored by means of flanges that run in the grooves, as shown herewith. For this reason, the makers claim steadiness, non-chattering and an even cutting edge. It is so built that a counterweighted hoisting attachment makes the reamer as easy to handle as a small tool. No lifting in and out of the block is necessary. The maker is H. A. Hopkins & Co., South Bend, Ind.

## Shop Equipment for Fleet Owners

### R. & B. Grease Pump for Barrels

**T** HIS is adjustable to any size of barrel or drum and will discharge semi-fluid materials such as greases, oils, soaps and paints, completely emptying the container. The hose is 8 ft. long. The foot of the pump has a double port opening, one for discharge and one for suction. The valve opening and closing these ports is operated by a handle at the top of the discharge end of the pump attached to a small steel rod which passes through the discharge pipe to the valve in the foot of the pump. The price is \$35. The maker is the Hermitage Auto & Pump Co., Nashville, Tenn.

### Sawyer-Weber Connecting Rod Machine

**T** HIS is a precision machine adapted to the testing of connecting rods with or without pistons and to the pouring and boring of connecting rod bearings. It will pour and bore half main bearings, whether bronze back, steel back or die cast, and can be used for testing connecting rod alignment by means of a wristpin against the parallel blocks when the piston is not available. The piston can be clamped endwise in this machine for reaming the wristpin hole. This method of clamping prevents warpage. The maker is the Sawyer-Weber Tool Mfg. Co., Los Angeles, Cal.

### Combination Press, Straightening and Truing Machine

**T** HE cross channel of this press is welded into the frame. The latter is slotted, making the raising or lowering of the table very simple. The truing-up device consists of a pair of centers, one a dead center and the other a movable center held to the work by a coil spring, and a set of four disks, machined to run true. This arrangement can be used to true crankshafts, camshafts, differentials, etc. The press has a gong which rings when the screw is about to reach its limit. This automatic alarm consists of a two-piece pressure plate, two V-blocks and a safety cap for the end of the screw. Made in two models, 50-ton and 30-ton. The prices are respectively, \$135 and \$98. The truing device costs \$15 extra. The maker is the Naperville Machine Co., Naperville, Ill.

## Utilitool

**T** HIS tool may be put to a variety of uses, a few of which are those of a pipe wrench, staple puller, monkey wrench, cutter, chain wrench, screw driver, etc. It consists of seven parts, all of which are interchangeable and can be replaced if broken. The length is 9 in. The maker is the Utilitool Co., Chicago.

## Miles Generator Tool

**T** HIS has been designed to perform all the operations in disassembling and assembling starting motors and generators for Fords, including removal and replacing rivets, gears, bearings and the screws in the field. A jig is furnished with each tool for holding the armature for all necessary repairs, truing and smoothing commutator, under-cutting mica on the commutators, etc. The maker is the Miles Mfg. Co., Newton, Iowa.

## HB Automatic Air Compressor

**T** HE makers guarantee this outfit to maintain a constant air pressure at all times, day and night, on the air line without attention, once the outfit is properly installed. A feature in design is the magnetic pressure release which enables the motor to start without load, saving current and always guaranteeing an instantaneous start.

The low-speed ball bearing compressor type of motor is built directly in the pump, the motor shaft being part of the pump shaft, making the motor and pump one compact unit. Air and oil filter, safety valve gage and tank are all standard equipment with this outfit.

The maker is the Hobart Brothers Co., Troy, Ohio. The price is \$25 cash and 10 monthly payments of \$18 each.

## Lathe Working Sets

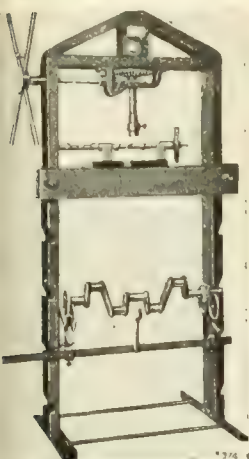
**A** LL cutters are made from high-speed steel. There are eight working sets, each varying in tool sizes and prices. Each set includes a holder and block. Prices range from \$5.85 to \$37.25. The maker is the O. K. Tool Holder Co., Shelton, Conn.

## Brak-Rite

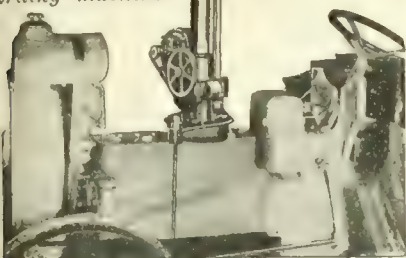
**T** HIS is a compound for preserving and maintaining the life of brake linings. It is stated that it will restore the original sure-gripping quality of the asbestos lining and that it removes the glazed surface, stops squeaks and makes the lining wear longer. This compound is made by the Brak-Rite Mfg. Co., Amsterdam, N. Y., and sells for \$1 in ½ pint cans and \$1.50 in 1 pint cans.



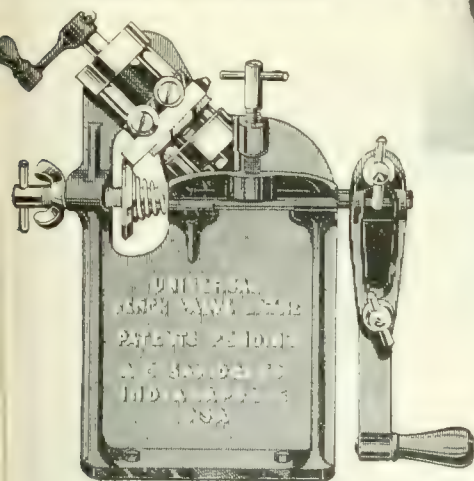
# Buyer's Department of The Commercial Vehicle



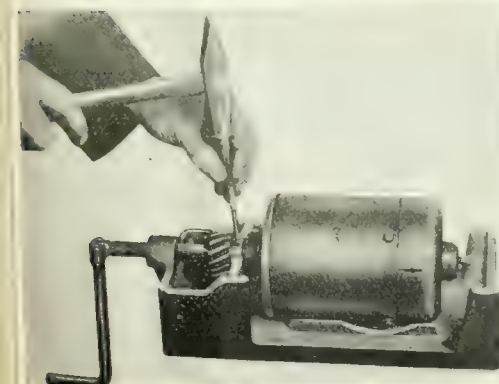
Arbor press, straightening and truing machine



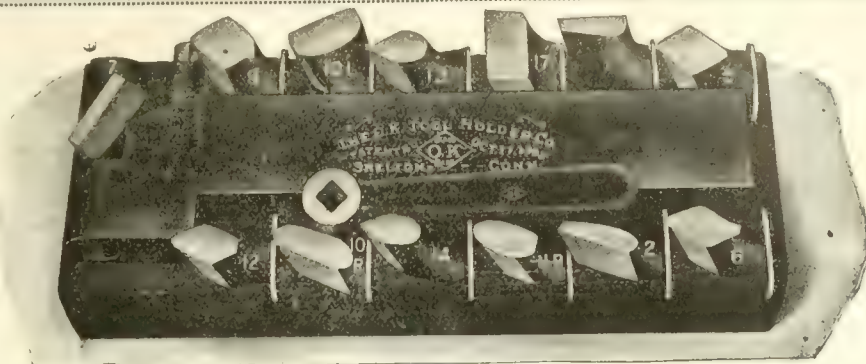
Storm reborring machine



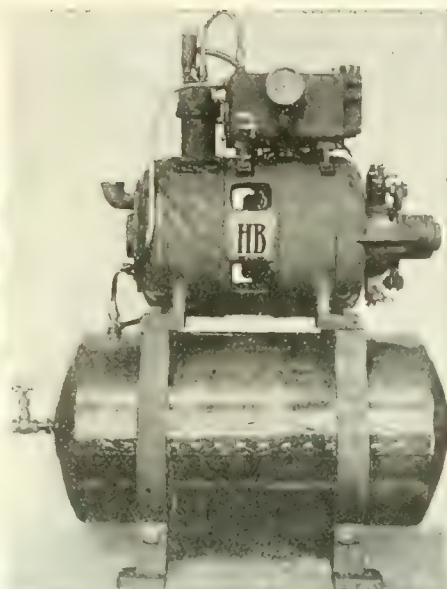
Savidge universal valve lathe



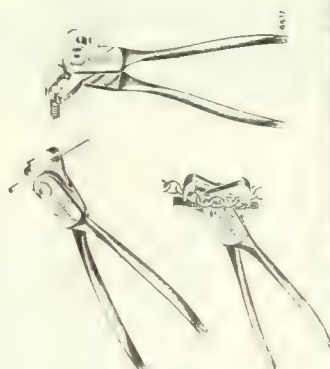
Miles generator tool



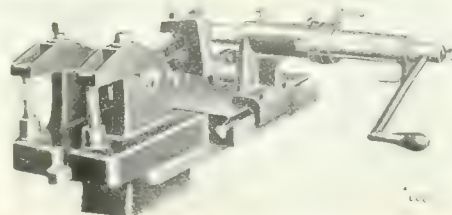
Lathe working sets



H B air compressor



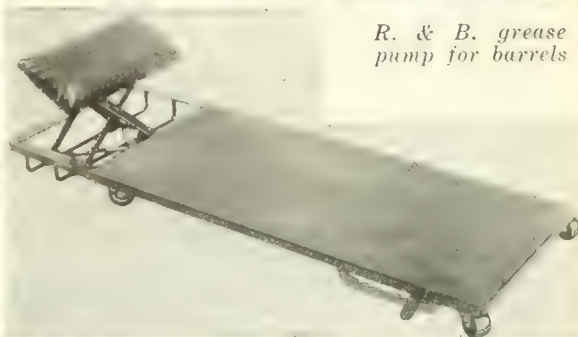
Utilitool



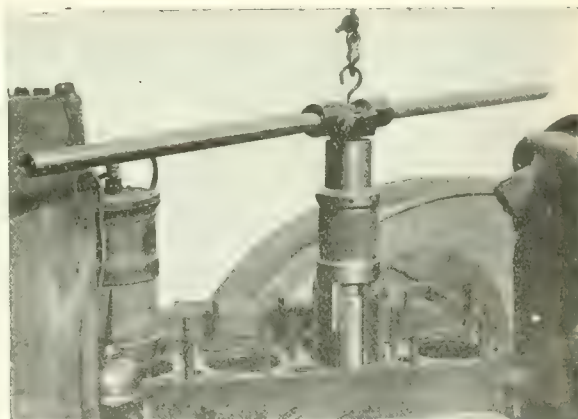
Sawyer-Weber machine



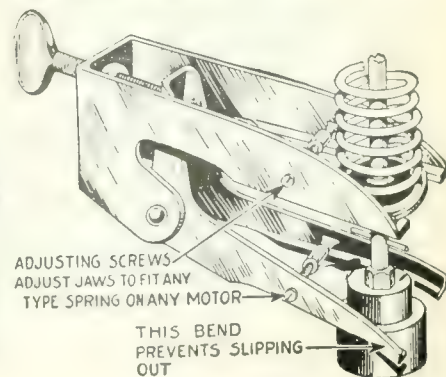
R. & B. grease pump for barrels



Knowles creeper



Ransome cylinder reamer



Sunnen valve lifter



## Buyer's Department of The Commercial Vehicle

# Van Dorn Horizontal Hoist Saves Body Space

### New Model Is Sturdy and Compact

THE Van Dorn horizontal hoist was built by the Van Dorn Iron Works Co., Cleveland, with the object of producing a small, sturdy and compact under body mechanical hoist. It is an improvement on the old Van Dorn horizontal hoist that has been on the market for seven years and which still is successfully working on a number of well-known trucks.

The lift on the Van Dorn horizontal hoist is caused by lift arms that are mounted on a rotating shaft and connected to the body by heavy links.

When the body is in a lowered position the lift arms are projected down from the center of the rotating shaft and the body connecting links are lying parallel with the lift arms.

When the hoist is operated these lift arms revolve in an upward direction and cause the body to raise until it is elevated at the point where the links are connected to a distance that totals the length of the lift arm and the link from the center of the rotating shaft.

In order to make it possible to stop and hold the body at any angle up to the

extreme height of the lift a single lead worm and worm gear is used to transmit the power from the power take-off to the heavy reduction gears that drive the lift arm shaft.

So as to eliminate any possibility of the operator allowing the gear mechanism to continue to revolve after the body has reached the extreme height or the extreme lower position, an automatic throw-out has been provided which operates a heavy positive jaw clutch when the body is elevated to the extreme height or lowered to the truck.

This automatic stop is controlled by the movement of the lift arm shaft and is very positive in its operation.

The clutch is operated by a shift fork and shaft of standard design.

To lower the body it is necessary to reverse the direction of rotation of the lift arm shaft and this is done by an idler gear that reverses the direction of the worm gear still allowing the drive shaft and power take-off to revolve in the motor direction.

The entire mechanism is enclosed in three cast steel cases, being the upper

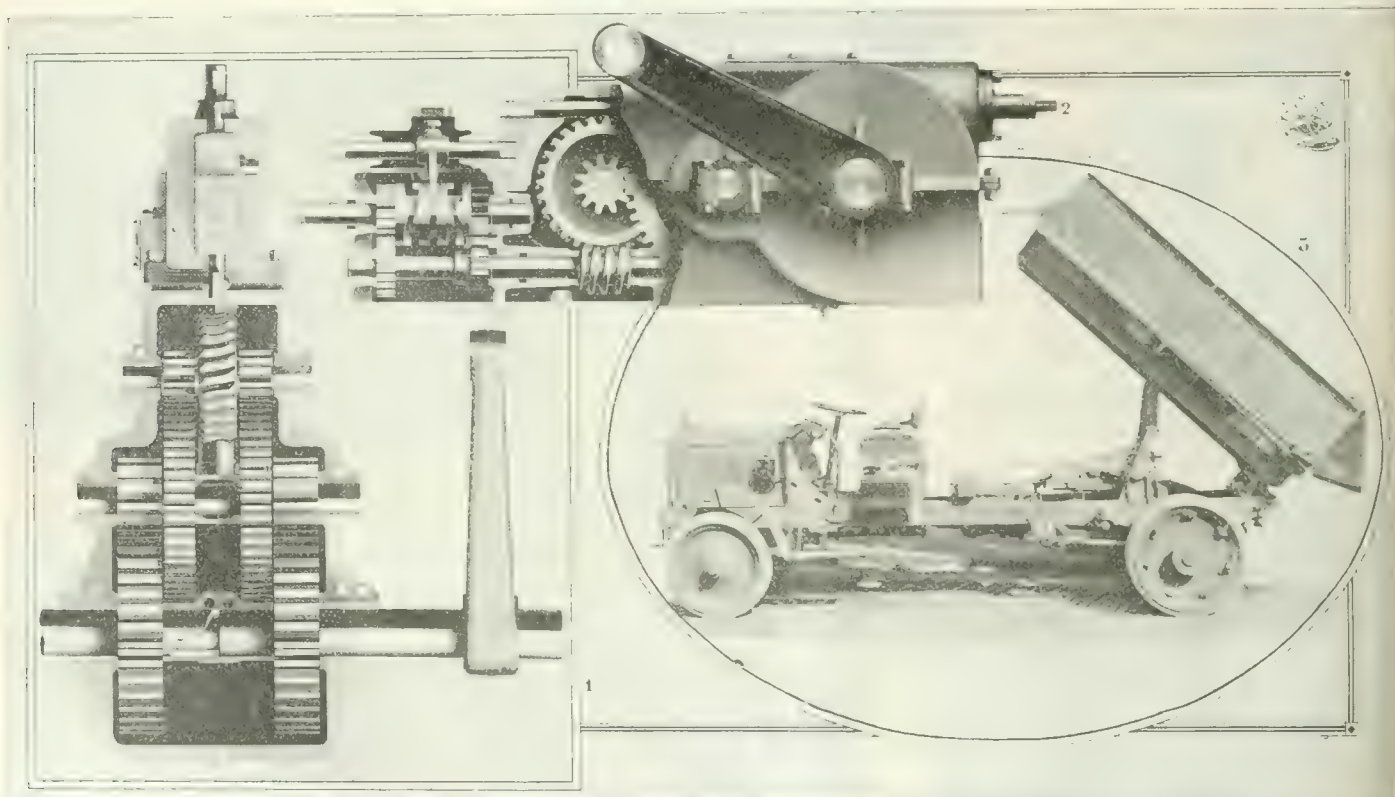
and lower main case and the reverse gear and clutch case.

The hoist is built in two models so that it can be operated from a power take-off having a clock or anti-clock-wise direction of rotation. This being taken care of by either supplying a right hand worm, worm gear and clutch or left hand worm, worm gear and clutch.

To operate the mechanism, it is necessary to move the operating lever that controls the power take-off of the truck and then shift the lever that controls the hoist clutch into the desired direction for raising or lowering. This clutch can be disengaged at any time during the raising operation and left in neutral or reversed.

The gear pitch of the reverse idling gears in the reverse and clutch gear case are of the stub tooth 6-8 pitch, the worm gears have  $\frac{3}{4}$ -in. lead, the intermediate reduction gears are stub tooth 4-5 pitch and the bull pinion and bull gear are involute tooth 3 pitch.

The worm gear thrust is taken care of by plain hardened steel and bronze thrust washers.

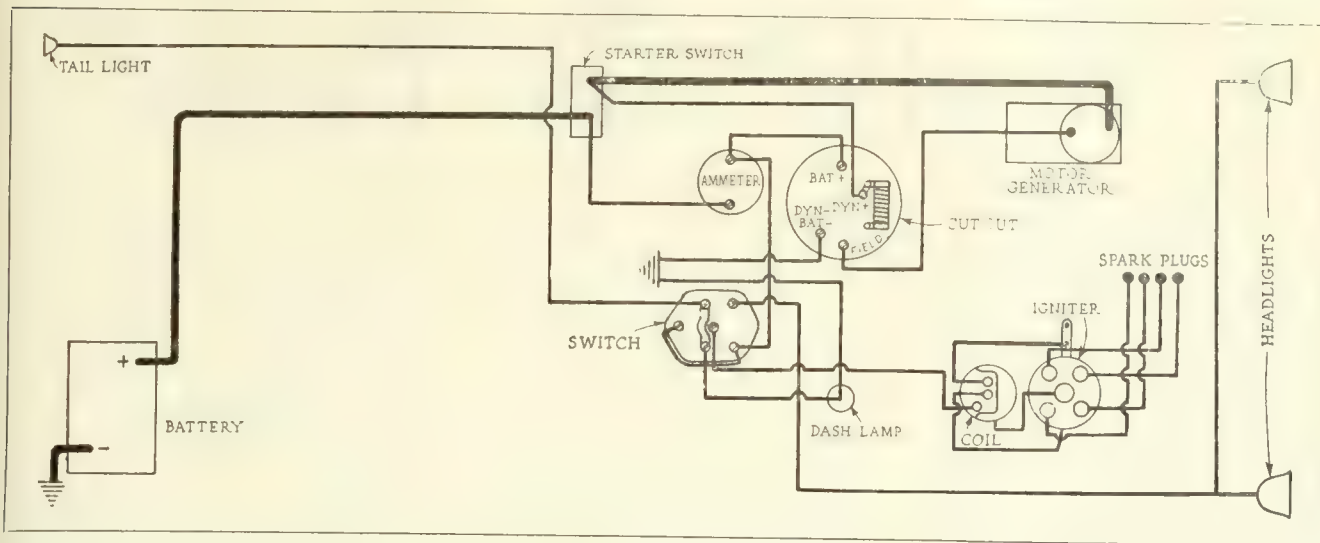


1—Top cutaway view of hoist. 2—Side cutaway view of Van Dorn horizontal hoist. 3—Method of mounting



# Motor Truck Electric System Wiring Diagrams

## 42—Starting and Lighting Unit on Seneca Truck



Starting and lighting system used on the 1921 Seneca truck, model L-20

### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

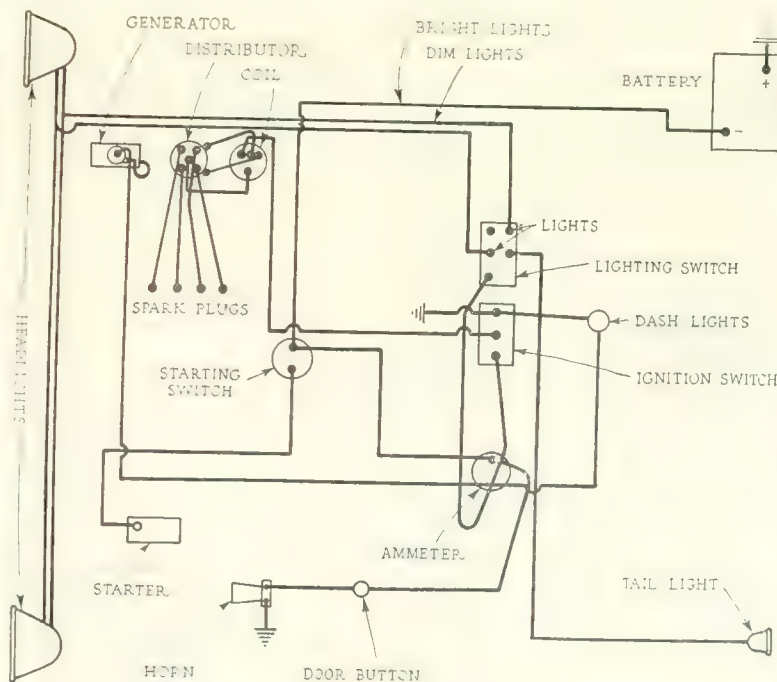
1920

1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting.....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15

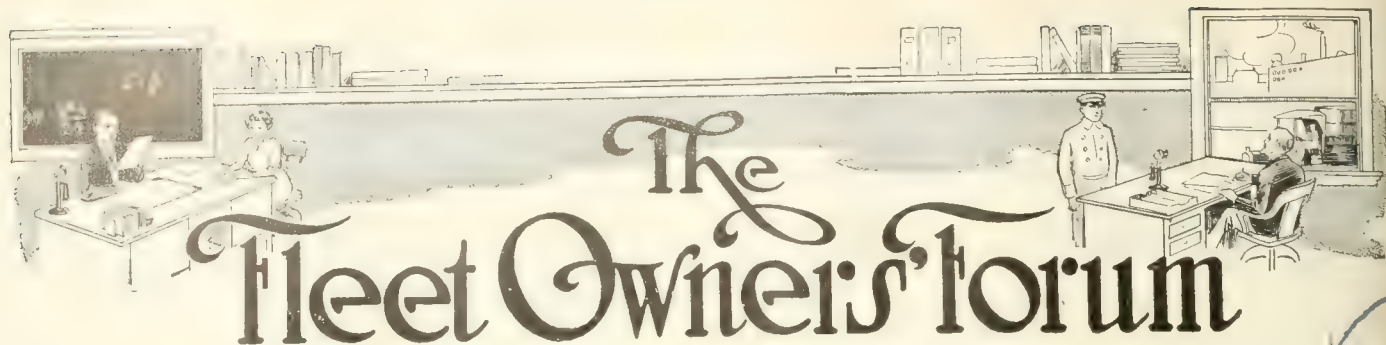
1921

12—Maxwell, Lighting.....	Jan. 15
13—International, Starting and Lighting.....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 15
17—Reo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Apr. 15
19—Stewart, Starting and Lighting.....	May 1
20—Kelly-Springfield, Starting and Lighting.....	May 15
21—Riker, Starting and Lighting.....	May 15
22—U. S., Starting and Lighting.....	Jun. 1
23—Wilcox, Lighting.....	June 1
24—Pierce-Arrow, Starting and Lighting.....	June 15
25—Republic, Starting and Lighting.....	June 15
26—Parker, Starting and Lighting.....	July 1
27—Noble, Starting and Lighting.....	July 1
28—Oneida, Starting and Lighting.....	July 15
29—Oshkosh, Starting and Lighting.....	July 15
30—Knox, Starting and Lighting.....	Aug. 1
31—Master, Lighting.....	Aug. 1
32—Watson, Starting and Lighting.....	Aug. 15
33—Service, Lighting.....	Aug. 15
34—Packard, Starting and Lighting.....	Sept. 1
35—Tiffin, Starting and Lighting.....	Sept. 1
36—Napoleon, Starting and Lighting.....	Sept. 15
37—Dorris, Starting and Lighting.....	Sept. 15
38—Moreland, Lighting.....	Oct. 1
39—Northway, Starting and Lighting.....	Oct. 1
40—Rock Falls, Starting and Lighting.....	Oct. 15
41—Locomobile, Starting and Lighting.....	Oct. 15
42—Seneca, Starting and Lighting.....	Nov. 1
43—Brockway, Starting and Lighting.....	Nov. 1

## 43—Starting and Lighting Unit on Brockway Highway Express



Starting and lighting wiring diagram on the Model E Highway Express truck built by the Brockway Motor Truck Co. Starting and lighting is standard equipment on this model



## How Many Mechanics Can Take Care of Ten Trucks?

To the Editor, COMMERCIAL VEHICLE:

We have just recently put in operation a fleet of ten  $\frac{3}{4}$ -ton White trucks. These trucks start out at 8 a. m. and invariably are finished at 6 p. m.

The writer would greatly appreciate having your opinion relative to the number of mechanics including the garage superintendent, that are necessary in order to properly take care of this fleet. Should two mechanics and the superintendent be able to handle the maintenance and repairs of these trucks?

Do you believe it advisable for the mechanics to work in shifts, which means one of them would not be constantly under the eyes of the garage superintendent, or do you believe they should work the same hours, therefore both being under the direct supervision of the garage superintendent?—READER.

Not knowing your system of operation it will be difficult for us to give you at the present time accurate information regarding your question covering the number of mechanics that will be necessary to have on hand for maintenance purposes.

We would judge offhand it is your desire to keep your trucks moving the maximum amount of time and that as a result any maintenance work should be accomplished at night so that the trucks will be ready for their deliveries in the morning. It would therefore be a good plan to have both mechanics on a night shift instead of the day in order to take care of emergency repairs as well as heavy repair work.

You state that your trucks finish their deliveries at 6 o'clock at night, so that from that time on any troubles that have been brought to your attention during the day should be attended to. We take it for granted that these two mechanics are competent enough to handle heavy repair work. If the garage superintendent is an expert mechanic we believe that he could handle emergency repairs or adjustments during the day. It would be a good plan to appoint one of the two mechanics as a foreman, therefore assuring proper supervision.

We do not know whether you have a system of repairs which covers mechanical troubles that occur during the day and if not we believe it would be a good plan to install THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks which also includes records from the drivers at the end of the day.

**D**EVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

You have not stated whether your working personnel includes washers or other men who take care of the oiling of the trucks. Possibly the drivers or mechanics take care of this work. It would be a good plan for you to place the responsibility for greasing of trucks as well as taking care of the engine oiling in the hands of the drivers, providing you are sure that they are sufficiently reliable to take care of this work.

## Is Your Knowledge Available?

**H**OW often have you remembered reading a certain article in THE COMMERCIAL VEHICLE and then found it impossible to locate? Nine times out of ten the particular issue has been mislaid. It would be a good plan to keep a permanent file.

In addressing this department, readers are requested to state whether a permanent file is kept, for many times inquiries to this department can be best and most fully answered by reference to previous issues.

## Reader Wants Information on Internal Gear Driven Axle

To the Editor, COMMERCIAL VEHICLE:

Will you please advise the writer in what year the first internal gear-driven truck was built, what was the special name of this particular internal gear-driven axle, and what has been the increase by years of this form of drive.—P. G., New York City.

We are sorry to state that no definite year can be ascertained. It is our impression, however, that V. G. Torbensen was the first one to bring out an internal gear-driven axle. You can obtain an answer to your last question by referring to the Jan. 1, 1921, issue of THE COMMERCIAL VEHICLE, pages 384 and 385.

## Wants Suitable Contract for Grocery Deliveries

To the Editor, COMMERCIAL VEHICLE:

Please furnish me with all information you may have on a suitable contract that I may enter into with three or four grocery stores for the delivery and pick-up of their groceries, etc. It is my intention to pick up the goods at the local market for these stores at one time and to make deliveries of same within a radius of 2 miles after they have been sorted.

I expect to operate a 2-ton truck to go out and get the orders and to bring in the goods from the market to a warehouse. Here the goods will be reloaded on two or three 1-ton trucks for delivery in the different parts of the city, having a set time that the goods are to be ready and delivered. I would like to know what a good rate would be and what kind of a contract would be right. What would the cost figure out? The contract would cover all of the stores.—C. W. HAIGHT, Quick Service Express, East Chicago, Ind.

You have not given us sufficient data to enable us to make an extensive answer but perhaps we can help you a little.

The amount you charge for making deliveries will depend entirely upon the kind of business you handle and the distances covered. For example, if you deliver 10 small parcels over a radius of 10 miles with a 1-ton truck, you will have to charge a pretty high price per parcel to make the work pay you. Whereas, if you have a full load you can charge as low as 5 cents per 100 pounds per mile and make money, provided the runs are short and provided you have enough business to make four trips per day per truck. It works out this way. You can roughly estimate your cost of operating a 1-ton truck at \$12 per day. Therefore, if you do not overload but carry a complete ton each trip on four trips daily, averaging 4 miles per trip, you would be receiving 20 cents per 100 pounds or \$4 per load, which gives you \$16 a day or about \$4 net profit. This is presuming that each 1-ton truck call for its load and delivers same.

We note your plan of calling for the loads with a 2-ton truck and then redistributing the load at some other point among the 1-ton trucks. Of course, we do not know your local situation, but this does not look like an economical arrangement. The 2-ton truck which would call for the goods and redistribute them would be entirely non-productive if you charged on the basis of deliveries made. You would therefore have to prorate the



cost of the 2-ton truck among the 1-tonners and increase your delivery charges accordingly.

To make this clear: Suppose your 2-tonner costs you \$15 a day to operate and you are operating five 1-tonners. You would then have to divide the cost of the 2-tonner among the 1-tonners, increasing the cost of the latter from \$12 to \$15 per day each. Supposing your charges for delivering to be 5 cents per hundred pounds or roughly \$16 a day, your margin of profit is only \$1 per 1-ton truck per day. This margin of profit is too low, first because it is an insufficient return on your investment, and, second, because you probably cannot be sure of full loads for all the trucks all the time and an attempt to operate on this basis would probably mean that you would lose money.

Collecting the goods with a 2-ton truck is an uneconomical duplication of effort, and we should suggest that you eliminate it if possible, calling at the shipper's loading platform with the 1-tonners, sorting the goods there and then delivering direct. In any case, if you are to make a flat rate per hundred pounds you must receive a guarantee of a certain amount of business or a certain regular return for your services.

Your problem was taken up with the secretary of the committee on truck transportation of the National Automobile Chamber of Commerce. The latter agreed that in your case it would be better to charge by the hour for the use of your trucks in your short haul work and charge 5 cents per 100 pounds per mile in suburban or interurban deliveries. Where you charge by the hour it would be better to obtain a guarantee that the trucks would be required for a certain number of hours daily. Where you charge per 100 pounds it would be better to obtain a guarantee, if possible, of a certain amount of tonnage to be hauled daily. Even if this guarantee is given, it would be well, if possible, to retain the right to use your trucks for other purposes or for other concerns when not required by the contracting party or parties.

If you care to send us further details of the proposition which the five stores mentioned have put up to you we shall be glad to go into the matter further and help you in any way we can. We are also enclosing cost records on a 1-ton truck engaged in somewhat similar work which may be of service to you.

## Engine Overheats After It Has Been Overhauled

To the Editor, COMMERCIAL VEHICLE:

We would like to know what makes an engine that has been overhauled, heat so badly that it boils the water in 5 minutes. After turning off the switch it continues to run for a minute or two. The pump works well, the water circulation and fan are in the best of condition, and all of the ignition parts have been replaced with new ones.—A. WILLIAMS, Norris-town, Pa.

Though you state you have overhauled your engine, it is still possible to attribute the trouble to late timing. How-

ever, you are so positive in your statement that the engine has been properly overhauled that we think it unlikely that you have made an error on the timing. If calcium chloride antifreeze solution has been used at any time it is possible that a coating of rust or scale in the water jackets is responsible. It can be removed with a strong lye water solution.

It will also be well to examine the hose connections closely. If these were not replaced, it is very possible that one of them has become oil-soaked inside and swelled so badly that it is restricting the water flow. This condition is many times present and unsuspected for the reason that the hose shows no swelling on the outside.

If new connections have been installed it will not be surprising if one of them is found doubled until the water passage is only a quarter of what it should be. This is a common occurrence and one which often causes serious damage to the cylinders and pistons before it is discovered. We strongly urge that the engine not be run to the overheating point until the fault is remedied, or if it is necessary to run it, that it be kept flooded with oil.

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

## Radiator Gets Too Hot—Scale Collection the Cause

To the Editor, COMMERCIAL VEHICLE:

My radiator gets too hot and I believe it should be cleaned out. Will you advise me as to the proper proportion of soda to use for this. Is there any special kind of soda to use? If you know of a better way to clean out the scale, please advise me.—J. E. ROBINSON, Arnett, Okla.

In certain territories, owing to the quality of the water, undue heating of the radiator has been caused by an accumulation of lime, iron or other impurities in the radiator as well as in the waterjackets of the engine. These impurities stick to the radiator just as scale sticks to a boiler. They form a dense and rigid armor-plating or sheath on these surfaces, and this sheath acts as an insulating wall between the hot radiator and the water, causing serious overheating.

These accumulations may be removed by means of a solution of hydrochloric (muriatic) acid, or caustic soda. Caustic soda is slightly less effective in removing the scale than hydrochloric acid, but it has one advantage. Unless hydrochloric acid is thoroughly cleaned out of the cooling system, it will gradually eat away any brass there may be on the pump. The use of caustic soda avoids this danger.

Caustic soda breaks up the hard deposit of scale into a powder or sludge which can subsequently be removed by a thorough flushing out of the pipes with

water. This action only takes place, however, if the strength of the solution of caustic soda lies between 15 per cent and 22 per cent. With solutions much weaker or stronger than these figures the action is very slow or inappreciable.

The solution is made in the correct proportion by dissolving 2½ lb. of solid caustic soda so that it makes 1 gal. of solution; 5 lb. so that it makes 2 gal., etc. The solution should be allowed to remain in the cooling system all night and run off in the morning. Caustic soda will corrode aluminum and should not be used if the cooling system has an aluminum pump cover.

The hydrochloric acid solution consists of one part of the acid of a specific gravity of 1.2 and three parts of water, by volume. This solution should be poured into the engine cooling system, through the upper water connection, until this part of the cooling system is quite full. It should be pointed out here that this solution must not be used in radiators, because it will attack any impurities in the copper and result in leaks in the radiator and a general weakening of the latter.

## Repairing Cracked Water-jackets by Welding

To the Editor, COMMERCIAL VEHICLE:

What is the best way to repair cracked waterjackets?—J. REILLY, Newark, N. J.

Most of the truck shops make a practice of welding cracked waterjackets and when the work is properly done the crack is not likely to open again. The simplicity of the repair is dependent upon the location of the crack. Both electrical and oxy-acetylene welding outfits can be used successfully by an experienced operator.

## Cleaning Old Oil Accumulations from Cement Floor

To the Editor, COMMERCIAL VEHICLE:

Please tell me the best way to clean old oil from a cement floor? This oil has remained on the floor without proper cleaning for a year and now I cannot get it off without scraping.

I use sawdust daily on all new oil that leaks from the trucks and cars but want to get the floor good and clean.—G. J. NEWTON, Prospect Street Garage, Waterbury, Conn.

You state that the oil has accumulated for a year and we are wondering whether, by this time, it has not become gummy through the accumulation or whether it has merely stained the cement floor.

As far as we know, Oakite, manufactured by the Oakley Chemical Co., 42 Thames Street, New York City, should fulfill your request. This is a special preparation and we are sure that you will be satisfied with its use.

The Autocar service station in New York uses spray of whitewash, which, to our mind, will also help you in cleaning off the oil. This spray, after it has dried, soaks into the oil and becomes a powder, which may be easily swept off the floor. We are also of the belief that covering the floor with a hot, weak lye solution will loosen any oil.





## Trucks to the Rescue!

THERE is a familiar ring about the expression, "Trucks to the rescue." The part that trucks played during the war is still fresh in the memories of those at least whom the trucks actually rescued. All over the country motor trucks served to relieve freight congestion on the railroads. Factories working at their peak of production found that trucks—and trucks only—enabled them to keep on working at that peak. And at that time, when the very life of the country and the other countries allied with it depended on rapid transportation and incessant transportation, motor trucks supplied the need and helped to win the war.

Then came peace. And with peace came a slackening of business until truck transportation, still important and, to those with vision, actually essential, ceased to be recognized as such by the unthinking masses. A period of economy—or, at least, a period when economy became increasingly important—followed. With it came a long series of attacks on motor buses and motor trucks, the one because they were reported to be irresponsible themselves and unessential, yet capable of eating into the legitimate profits of responsible and essential classes of transportation; the other because they were supposed to be destroying the country's roads.

Because an economical era had set in—because industry slackened with the falling off of buying—the immediate and vital need of truck transportation lessened also, or appeared to do so. And so the public in general became more ready to listen to attacks on motor truck and motor bus transportation on the part of aggregations far from disinterested in making these attacks.

But now comes a change. The country is threatened with a railroad strike. If trains cease to run, how are the cities to be fed? How are necessary fuel supplies and necessary mails to be transported? How are commuters to reach their offices? These cries are heard on all sides, because they are questions facing all communities.

What is the single answer vouchsafed in all cases—as being not only the only possible means, but also an actually efficient means of solving the problem and relieving a very grave situation? The answer

is—motor trucks. And it is a curious fact that in many cases the answer is given as a sort of discovery, as a sort of sudden brilliant idea, as though motor trucks had not long since saved the country in an equally immediate and even graver danger.

All over the country now Federal, State and municipal authorities, notably the Port of New York authority, are counting their resources and laying out their plans to relieve the situation by means of motor trucks if the worst comes to the worst and the railroad strike materializes.

But the question is: How many times is the motor truck going to shrink into insignificance in the eyes of the public as soon as the vital and immediate need for it, as the *only* source of help, is past? How long is it going to take the public to realize that, if the truck can save the situation when other means fail, it has a vital place in the transportation of the country alongside of the other means of transportation?

**If truck transportation is vitally important at any one time it is vitally important all the time.** If it can step into the breach and protect the vast mass of the people from being held up at the point of a gun by a certain group or certain groups of the people, then it is vitally important, regardless of whether or not it is the most economical type of transportation in *any* field.

But when all this is said, there remains the big outstanding fact, which nobody can deny, that motor trucks are not only important as time-savers, important as rescuers in emergency and important as openers of new territories and hence as builders of all industry, but they are actually, in certain cases, the most economical means of transportation ever invented. And they are available now and always.

This is an economical time, and the country is in an economical mood. But that is no reason for attacking trucks. For they, too, can help economize.

At this time, when trucks again stand ready to come to the help of the entire country, it is up to the industry as a whole and to the operators of trucks generally to see that truck transportation is recognized once and for all by the public as a vital economical and permanent factor in the country's transportation system.



## New York Prepared for Strike

### Port of New York Authority to Co-ordinate All State Trucking Facilities

NEW YORK, Oct. 21.—If the railroad strike takes place, New York City not only has the transportation facilities to take care of feeding the city and bringing in other necessities, but also has an organization with the knowledge, the resources, the authority and the internal co-operative system to handle the supplying of the city with the highest effectiveness and economy.

The Port of New York Authority is a board established by the States of New York and New Jersey to deal with the development of the Port of New York as a great transportation gateway. This afternoon, the Governor of New York, in a consultation with the Port of New York Authority, conferred upon the latter body full authority to handle all transportation facilities available in the Port of New York, in the event of a strike.

As outlined by Elihu C. Church, consulting engineer to the Port of New York Authority, the plans of that body, in the event of a strike, are as follows:

The truck ton-mile has a 10-mile per hour basis. What trucks can carry, depend upon four things: Number of vehicles available, speed on route, proportion of time running, and full loads carried.

In view of the above facts, the Port of New York Authority will be organized, in the event of a strike, along the following lines: One member of the board will be in touch with the retailers, to determine what supplies are needed and where they are most urgently needed. Another member will be in touch with wholesalers all over the metropolitan area, to determine where such supplies can be found. Another member, probably appointed by the State Highway Commission, will have the authority to declare certain roads "trunk lines" and to close them to other traffic for a certain period, during which period another member of the board will have arranged to have the goods collected at one loading point, and still another member will have allocated certain means of transportation—trucks, freight trains, shipping, etc., to that particular haul at that particular time. In the case of trucks, operating over a so-called "trunk road" the trucks will make the journey in convoy both ways and under the leadership of motor cycle patrolmen of the police department.

Other members of the board, or committees, will have charge of making sure that the necessary number of vehicles are available, that the trunk road traffic is policed and regulated, that trucks are dispatched on time, that there are facilities for repairs in case of breakdown, that proper loading and unloading facilities are available so that no disproportionate amount of time is con-

### N. Y., N. H. & H. WILL USE THREE MACKS ON RAILS

NEW YORK, Oct. 18.—The New York, New Haven & Hartford Railroad has placed an order with the International Motor Co. for three Model AC Mack rail cars, which will be used to handle short haul passenger traffic on branch lines.

Many of the smaller railroads have been using motor equipment for some time with such success that the larger railroads are now planning to use it on branch lines.

The Macks will seat thirty-six passengers and will, in addition, have a baggage room, 6 by 9 ft., at the rear. The engine and several other component parts are the same as are used in the Mack AC truck, but the leading four-wheel truck, rear axle and wheels, and the high-speed reverse gearset, which permits of operation in either direction at about the same speed, are special.

Electric starting and lighting and exhaust heating are provided for.

sumed in loading and unloading and finally, that the loads are so allocated to trucks, cars and ships as to take advantage of the maximum haulage facilities both as regards bulk and as regards weight. For the highest efficiency, transportation facilities must be loaded so as to take advantage of full capacity as regards both bulk and weight.

### Strike News

HARTFORD, CONN., Oct. 26.—Though the railroad strike may become a reality and trucks be used to the extent they were in war time, the State of Connecticut will not permit overloading, according to an announcement from the State capitol. The State accords a welcome to trucks from other states, but they must comply with the law.

INDIANAPOLIS, Oct. 21.—Indiana is going ahead during the railroad strike. Highway transport is the answer: Already organized on a State-wide basis into a compact emergency unit by the co-operation of nineteen State-wide industries which operate in the transport, transfer, warehouse and automotive field. Over 20,000 trucks will be available. To-day a plan worked out in detail was laid before Governor Warren T. McCray by Tom Snyder, secretary of the Indiana Highway Transport & Terminal Assn., and by Lynn M. Shaw, secretary of the Indiana Automotive Trade Assn. In the conference the suggestion was made and received the approval of the governor that he shortly call a conference of the nineteen industries of the State that employ highway transport, that there be a transport commissioner appointed, and a highway information supervisor to direct the traffic.

## Pacific Coast Is Not Worried by Strike

### Trucks and Good Roads Will Take Care of Any Emergency—Fully Prepared

SAN FRANCISCO, CAL.—The railroad strike, should it be called on Nov. 1, as now threatened, will find the three Pacific Coast states in condition to distribute their own food supplies, and handle their own transportation problems. This, in the opinion of men engaged in transportation in all three states, is due to the prevalence of motor trucks and of good roads penetrating all sections of all three of these states, and of navigable inland waterways running extensively through two of them—Washington and California. There is little, if any, prospect of a serious shortage of food supplies, or delay in distribution of those supplies in either of these three states, but passenger traffic, other than essential going to and fro for business reasons, probably will be curtailed.

B. W. Evans of Tacoma, Wash., operator of several motor truck fleets, and closely connected with water-transportation as co-ordinated on Puget Sound, the Columbia River and other waterways in that state, who is in San Francisco studying the operation of motor truck freight and passenger lines in northern California, said:

"We are so well protected with roads and waterways in Washington that we are not much worried about the coming railroad strike. We believe the strike will be called, but we are rather willing to let it come, so as to see, under really genuine conditions, just what the motor truck and motor boat and barge fleets will do and how they will handle the traffic."

### Death of P. J. Finnegan

CHICAGO, Oct. 13.—Patrick J. Finnegan, president of the Cartage Exchange of Chicago and secretary of the Jos. Stockton Transfer Co., Chicago, died suddenly to-day at his home in this city. An authority on motor truck, transfer and commercial warehousing affairs, Mr. Finnegan was a familiar figure at conventions attended by men of those industries in all parts of the country. He was six times elected as the directing head of the Cartage Exchange of Chicago. Mr. Finnegan was born in 1871. He had been with the Jos. Stockton Transfer Co. as secretary since 1906.

### Truck Caravan Starts Long Trip

CHICAGO, Oct. 24.—A new idea in long-distance transportation of tourists by means of motor buses was put into effect yesterday by the T. & S. Tourist Co. of this city when it started four White 10-passenger buses and a fleet of privately owned touring cars for New Orleans. The caravan will cover 1135 miles on the journey.



## Federal Price Cuts Average 22%

**Reductions Range From \$550  
to \$850—Fourth Cut in  
Last Two Years**

DETROIT, Oct. 21.—Price cuts running as high as \$850 are announced by the Federal Motor Truck Co. The average is about 22 per cent on all models and the reduction is the fourth within the last two years. The prices follow:

	New Price	Old Price
1 ton.....	\$1,800	\$2,500
1 1/2 ton.....	2,175	2,775
2 ton.....	2,425	3,025
3 1/2 ton.....	3,150	3,950
5-6 ton.....	4,650	5,350

Reductions of \$600 and \$800 have been made on the light and heavy duty tractors.

CHICAGO, Oct. 25.—Price reductions announced by the Diamond T Motor Car Co. on all its models are as follows:

	Old Price	New Price
1 ton.....	\$2,500	\$1,975
1 1/2 ton, model F S.....	2,960	2,325
1 1/2 ton, model T.....	2,650	2,250
2 ton.....	3,285	2,650
3 1/2 ton.....	4,675	3,750
5 ton, model E L.....	5,400	4,325
5 ton, model S.....	5,670	4,500

MILWAUKEE, Oct. 25.—The Sterling Motor Truck Co. announces the following price reductions:

	Old Price	New Price
1 1/2 ton.....	\$3,200	\$2,885
2 ton.....	3,500	3,085
2 1/2 ton.....	3,650	3,290
3 1/2 ton.....	4,600	4,325
5 ton, model 5W.....	5,500	4,950
5 ton, model 5C.....	6,000	5,500
7 1/2 ton.....	6,500	6,000

CLEVELAND, Oct. 24.—The Hal-Fur Motor Truck Co. announces the following downward revision in its prices:

	Old Price	New Price
1 1/2 ton.....	\$2,350	\$2,200
2 1/2 ton.....	3,250	3,000
3 1/2 ton.....	4,250	4,000

YORK, PA., Oct. 24.—The Atlas Truck Corp. announces a reduction in its one-ton model from \$1,550 to \$1,185.

KENT, OHIO, Oct. 24.—The Thomart Motor Co. has reduced its price on the Akron Multi truck, model 20, capacity 1 1/4 tons, from \$1,995 to \$1,695.

## Wants 14-Ton Weight Limit

COLUMBUS, OHIO, Oct. 20.—The Columbus Commercial Haulers' Assn., formed some time ago to look after the interests of commercial haulers in all lines, at a recent meeting took steps to open a publicity campaign to permit heavier truck loads on the streets and roads. Under the recently enacted Ohio State law the limit of truck loads and cargo is 10 tons, while under an ordinance adopted by the Columbus City Council the limit is 12 tons. The Columbus Commercial Haulers' Assn. will work for a 14-ton limit in both the State law and the city ordinance. The publicity campaign will

## SAVES STATE \$30,000 BY RECLAIMING TIRES AND BODIES

INDIANAPOLIS, Oct. 22.—By reclaiming \$15,000 worth of solid tires for trucks, which dealers claimed could not be marketed for more than \$800, and remodeling steel and wooden bodies on motor trucks formerly in Government service, at an approximate cost of \$29 and \$50 respectively, George N. Barkley, chief of the motor transportation department of the state highway commission and superintendent of the state garage, is saving the state about \$30,000. In addition to the saving, this work will place at the disposal of the construction and maintenance departments, equipment that for months lay idle, some of which could not be stored for lack of garage space and which was deteriorating under exposure to the elements.

be carried along the lines of the benefits accruing from the motor transportation system which has been developed. The association has 29 active and 12 associate members and a large majority of the large haulers are affiliated.

## Schrader Price Reductions

NEW YORK CITY, Oct. 19.—Effective Nov. 1, A. Schrader's Son will make the following reductions on its products: Tire pressure gage, from \$1.50 to \$1.25; truck tire gage, from \$2 to \$1.75; valve caps, from 40 cents a box of five to 25 cents, and valve insides, from 40 cents a box of five to 30 cents.

## New 2-Ton Maccar

SCRANTON, PA., Oct. 25.—An additional model, of 2-ton capacity and known as Model H-A, has been developed by the Maccar Truck Co. It is fitted with a Continental four-cylinder, 4 1/2 by 5 1/4-in. engine, Maccar fin and tube radiator, Zenith carbureter, Eisemann high-tension magneto, Mueller governor, Brown-Lipe gearset and clutch, Spicer universals, Merrill springs, Ross steering gear and Timken worm-drive rear axle. The truck has a wheelbase of 150 in. and is also made in a long model with 162-in. wheelbase. The rear axle is of the full floating type, and gives a reduction of 8.5:1 on high and 45.47 on low gear. The frame is made of alloy steel 1/4 in. stock, the channels having a height of 6 3/16 in. and a width of flange of 2 1/2 in. Of the total weight of the loaded truck, 70 per cent rests on the rear axle and 30 per cent on the front axle. The weight of the complete chassis is 5200 lb. Steel wheels are fitted with solid tires, 36 by 4 in. single in front and the same size dual in the rear. The chassis price is \$3,300.

## Big Drop in Prices of Gasoline

**Average Quotation in Thirty  
Largest Cities Is 20.4  
Cents Per Gallon**

NEW YORK CITY, Oct. 22.—The average wholesale price of gasoline in the thirty largest cities of the United States is approximately 20.4 cents a gallon, as compared with 29.3 cents a gallon on Jan. 1. This is a decline of 8.9 cents, or 30 per cent.

A decline of 13 cents since the first of the year is shown in Dallas and Denver, while the price has fallen off 12 cents in Tulsa, Okla. The price is highest in Boston, where it is 26 cents a gallon.

## Uniform Traffic Regulations Needed

SAN FRANCISCO, CAL., Oct. 17.—At least 80 per cent of the arrests of truck drivers for violation of the traffic laws—especially for minor violations—would be eliminated if the State had uniform traffic rules and regulations in operation in every county, in the place of the numerous and often conflicting county ordinances now in force, according to speakers at the recent annual convention of the California Highway Patrolman's Association held in Sacramento.

## Pennsylvania Prepares for Snow

HARRISBURG, PA., Oct. 20.—Seventy snow plows, 140 motor trucks, 60 road machines and several hundred road drags will be used for the removal of snow from State highways this winter. Plans call for the keeping open for traffic of 1200 miles of highways.

## Plan National Distribution by Truck

NEW YORK CITY, Oct. 17.—If the railroad strike comes, at least one big manufacturer is preparing to fall back upon motor trucks. According to Mr. Gulick, of the Universal Film Co., that company is anxious to get in touch with some large fleet or organization of fleets of motor trucks which would be able to distribute the output of the film company to cities and towns all over the United States, in the event of an extensive railroad strike.

There is no such fleet or organization in existence at the present time which does not depend upon the railroads for its longer intercity connections. But if the strike comes and there are other big companies of like mind with the Universal Film Co. the demand may create the supply of such an organization. It is even possible that the American Railway Express, with its great fleets of trucks, may organize in some such way rather than suspend intercity operation when the railroads do.



## Big Field for Buses in Ohio

### Big Network of Lines Connect All Counties of State

CLEVELAND, Oct. 25.—The present year has brought about an unusual development in the motor bus business in Ohio. Lines are springing up all over the state. Manufacturers assert that this field is rapidly forging to the front. The new system of transportation is to-day a strong competitor not only of the interurbans, but also of the steam railroads. The state is criss-crossed by over 200 motor bus lines. There is not an important county seat in the eighty-eight counties of the state that does not have a bus line extending into nearby cities and villages.

In Cleveland one bus line has its terminal in the public square directly in front of the Interurban passenger station. It is a common sight to see more passengers bound for Lorain get into the bus than into the interurban car.

Over on the other side of the car, the Akron bus line has its local terminal in front of the station of the Northern Ohio Traction Co., which runs into Akron. The buses that leave Cleveland for the south are always loaded. This sight is to be seen in all the more important county seats. There is a rush to get into the bus.

Most of the bus lines, the tariff shows, charge just enough under the interurban fare for the same distance to attract passengers. Many letters are received from interurban officials asking whether such and such a line is registered.

Earnings of some of the bus lines are said to be enormous, in consideration of the amount of money invested. One line operating out of a certain city runs two buses into a neighboring city. Each bus makes nine round trips a day, and carries ten average through fares on each trip. The fare is \$1 for the round trip.

Between Youngstown and East Youngstown, a distance of three miles, twenty separate bus lines have filed schedules with the utility commission. The records show that the greater number of motor lines are in northern Ohio, where the land is level and the roads are better.

### First to Operate Buses on Rail in California

SAN FRANCISCO, CAL., Oct. 17.—The Pajaro Valley Railroad Company, operating between Spreckels and Salinas, has entered the motor bus field in an attempt to replenish its treasury and to make up for some of the losses suffered in competition with motor bus and motor truck lines in that section. With the granting by the California State Railroad Commission of permission to operate motor buses instead of certain trains over its lines, the Pajaro Valley

### BUS MORE ECONOMICAL THAN RAIL, TEST PROVES

NEW YORK, Oct. 20.—A test conducted by the Society of Automotive Engineers to determine the relative cost of railroad and motor bus transportation over long distances proved the motor vehicle to be distinctly more economical. The test was a trip from New York to Aberdeen, Md., and return, a distance of 352 miles. The total running time for the motor bus was 18 hours, making an average speed of 19 miles an hour.

The entire cost of the trip for gasoline, oil, wear on tires, depreciation on the bus, driver's wages and expenses, with twenty-two of the twenty-five seats occupied, was less than 1.25 cents per passenger mile. The railroad coach fare is 3.6 cents a mile. The passengers on the trip were members of the Society of Automotive Engineers.

Railroad becomes the first rail line in the State to enter the field of automotive vehicle operation.

At the hearing on its application for permission to substitute motor buses for certain of its trains, the railroad company's representatives showed that it is and has been for some time losing money, and that the operation of these motor passenger vehicles would replenish the treasury. Accordingly, permission to operate passenger, express and freight service by motor cars was granted to the company, on condition that the same rates charged for train service should apply to the bus service. A few permits have been granted in California to operate motor bus and truck lines as auxiliaries to the regular rail service, but never before to operate them over routes where tracks had been laid, and over which regular train service was to be discontinued in favor of the motor service.

### Rockford Trolley Interests to Use Buses as Feeders

ROCKFORD, ILL., Oct. 20.—The street railway company in this city is to be permitted to continue, by the action of the City Council, to permit the company to operate a line of motor buses as feeders. These buses will be placed in sections of limited population where it has not been desirable to construct extensions. They will pick up patrons and transfer them to the trolley cars. By this action the City Council goes on record recognizing the motor bus as an adjunct to the trolley cars and places the bus system under the single management. The action is experimental and was a disappointment to the Fay bus company which has been seeking exclusive service. One year's tryout of the new plan is allowed.

## Bus Franchise Costs 1 Cent per Mile

### Columbus in Regulating Buses Adopts Ordinance That Is Severe in Scope

COLUMBUS, OHIO, Oct. 21.—Motor bus lines in Columbus will be completely regulated by an ordinance adopted by the city council following a discussion of five weeks. The ordinance, which becomes effective in thirty days, provides for the payment of 1 cent per mile per bus as a license or franchise fee, intended to cover the cost of street wear. Payments are to be made in advance on a yearly basis.

In addition, each company must deposit a surety bond of \$25,000 or carry liability insurance to the amount of \$5,000 for the injury of a single person, or \$25,000 for several persons, and \$5,000 for damage to property. Council reserves the right to regulate routes and fares. No bus line shall be operated on a street supplied with street car lines. The bus must not be more than 86 in. wide, must be properly lighted and heated when the temperature falls below 35 deg.

### Common Carrier Classification for Trucks Under Contract

SAN FRANCISCO, CAL., Oct. 22.—Operators of motor trucks or of motor truck fleets working under contracts of employment in California must obtain certificates from the California State Railroad Commission, according to a ruling just issued by that commission in granting the application of H. W. Moore for a freight truck service between Stockton and Oakdale, Cal. Mr. Moore had been operating under the assumption, which is common in the State, that private contracts for the employment of motor trucks in transportation do not require the approval of the commission. The new ruling is important since it virtually puts all motor trucks under the classification of common carriers, no matter in what kind of work they are engaged.

In granting permission for the operation of his freight truck service to Moore, the commission comments on the situation as follows:

"There is no suggestion in the Auto Transportation Act that one operating at irregular intervals, or one operating under contract of any kind, is not subject to regulation. If one engaged in the business of automotive transportation could avoid the regulatory provisions of the law by merely operating at irregular times, a handsome premium would be placed on poor service to the public, for one of the essentials of transportation service is regularity of operation. The shipping public is entitled to know when and under what conditions transportation is available.

"As to operating under contract, every shipment involves the establishment of a contractual relation between the shipper or the passenger and the carrier. Yet, if a carrier could avoid public regulation by executing a contract of a specific type, it would result in defeating the very ends sought by the enactment of the statute regulating the transportation of passengers and property by automotive vehicles. It will not be seriously argued, of course, that the legislature intended such a result."



## Will Handle Indiana Truck Problems

### Industries Organize to Hold Conferences for Discussing Transportation Needs

INDIANAPOLIS, IND., Oct. 16.—Believed to be the first organization of its kind, the "Allied Motor Commerce, Inc. (of Indiana)" became a permanent organization this week. Its constitution, adopted in a meeting called for permanent organization, dedicates it to pursuits that can have an immensely valuable influence on the development of motor vehicle commerce.

Interests represented in the permanent organization meeting were the Master Plumbers Assn., Indianapolis Transfer Assn., Indiana Transfer & Warehousemen's Assn., Indiana Automotive Trade Assn., Indiana Assn. of Electrical Contractors, Indianapolis Commercial Warehousemen, Indiana Highway Transport & Terminal Assn., Indianapolis Coal Dealers' Assn., Associated Cleaners & Dyers of Indiana and the Indianapolis Sand & Gravel Assn.

It is anticipated that by Jan. 1, 1922, the organization will have seventeen Indiana state groups affiliated, representing some 20,000 of the 45,000 motor trucks operating in Indiana.

The Allied Motor Commerce is not to replace any of the organizations now in existence. It does not contemplate taking over the work of any of them. Its purpose is to provide a state conference of all industries using motor vehicles in business. Legislation, taxation, licensing and all regulatory matters will be primary interests. Through centralization in this organization the full power of the motor commerce of the state can be brought to bear on every problem. Officers are to be elected in a general meeting in the latter part of November. Membership in the conference must be by association, each group getting one delegate from every 100 trucks represented in the group membership. Each association must pay into the A. M. C. treasury \$1 per year per truck. Tom Snyder of the Indiana Highway & Transport Assn., and L. M. Shaw, of the Indiana Automotive Trade Assn., were promoters and organizers. They expect to continue assistance until the organization gets under way.

### White Service in Louisville

LOUISVILLE, Oct. 22.—A factory branch of the White Co., Cleveland, has been established here for the selling and servicing of White motor trucks.

### New Location for 1922 Electric Truck Show

NEW YORK, Oct. 17.—The exhibit of electric trucks and elevating platform industrial trucks will be a big feature of the fifteenth annual electrical show at the Grand Central Palace in 1922. This

## PECULIAR ANGLE TO MUNCIE'S "FREE" BUS SERVICE

INDIANAPOLIS, Oct. 17.—As a result of the war between the bus owners and the Indiana Union Traction Co., the latter, backed by an ordinance passed recently by the council, all buses today carry the sign "Free."

While the buses pursue their accustomed routes over streets used by the street cars, the policemen, charged with the duty of keeping buses off these streets, appear rather perplexed. Apparently, if the bus drivers do not charge for the use of their machines they are not violating the city ordinance, which says that these buses shall not be operated for hire in streets which have car service.

The truth is, of course, that the drivers are receiving money, for they accept contributions offered by those who ride in their cars. The law, apparently, does not cover this, and it also is rumored that one who fails to make a contribution is not "seen" by some of the drivers the next time one waits to be picked up.

year the exhibitors were handicapped by lack of floor space. Next year will see exhibits of trucks ranging from ½-tonners to 6-tonners.

### Winther Changes Name

CHICAGO, Oct. 16.—The Winther Motor Truck Co., Kenosha, Wis., has increased its capital stock from \$22,000,000 to \$61,000,000 and has changed its name to Winther Motors, Inc. The new concern embodies the Kenosha Wheel & Axle Co. and the Marwin Truck Co.

### Republic to Open City Branches

ALMA, MICH., Oct. 21.—The Republic Sales Corp. will establish branches, in place of distributors, in five large cities—Chicago, Boston, Detroit, Pittsburgh and Baltimore. In New York the Republic-Crabtree Co., distributor, will continue, and it is understood will take over the parts depot which has been operated independently by the factory organization.

### Coming Events

- 1921  
Nov. 14-19, Jersey City, N. J., Truck Show, Fourth Regiment Armory.  
1922  
Jan. 19-25, Milwaukee, Wis., Truck Show, Auditorium.  
Feb. 6-9, Scranton, Pa., Truck Show, Armory.  
Feb. 12, Madison, Wis., Truck Show, Cartwell Bldg.

## Intensive Study of Road Service

### Government to Use Trucks to Test Various Road Building Materials

CHICAGO, Oct. 25.—Sometime within the next few months a new road 2½ miles long is to be broken up in what is probably the most extensive study of road service ever undertaken in the United States. The road is located in Illinois, about 12 miles southwest of Springfield.

There are seven general types of paving in the road, the idea being to have represented the chief materials used in road-making so that engineers may study the effect of known and measured traffic of varying degree upon each kind of road.

The road, known as the Bates experimental road, was constructed by the division of highways, Illinois Department of Public Works and Buildings, in cooperation with the Bureau of Public Roads, United States Department of Agriculture. Actual work was begun on the road in June, 1920, and it was finished sometime ago. Since its completion the State and Federal Government engineers, by numerous daily observations, have been measuring the effect of heat, cold, moisture and other elements upon its surface and on the subgrade. These observations have been taken on 63 sections and much information has been obtained.

At the proper time, now approaching, the first motor vehicle will be turned upon it. It is planned to subject the highway to a rigidly-controlled truck traffic. The trucks are to be weighed and the weights will be gradually increased from a light load to one 50 per cent greater than that allowed by Illinois law. The number and weight of loads required to produce failure in the various sections will index the behavior of the various types of pavements when subjected to different kinds of traffic.

Observations have been made and are being continued for determining the bearing power of the subgrade when subjected to static and impact loads. One of the interesting deductions is that on a 7-in. surface, the influence of an 8000-lb. wheel load is felt through a distance of 17 ft. on each side of the wheel. This would mean that the pressure produced at any point by a truck running at a moderate rate of speed would increase from zero to the maximum pressure in about 1 sec. and decrease from maximum to zero in the next second.

### Making Buses for Akron

AKRON, OHIO, Oct. 17.—The Northern Ohio Traction & Light Co. is constructing three 25-passenger buses, finished in style similar to the standard make of street car and shod with pneumatic tires and is planning to put them in operation at once on Akron streets not now traveled by street cars.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
U. P. O. Building  
239 West 39th Street, New York

## CONTENTS

Vol. XXV, No. 8

November 15, 1921

### LEADING ARTICLES

Do You Use Salesmanship to Sell Truck Haulage?..	7
The Truck Driver Legally an Agent . . . . .	12
The Driver and the Idling Engine.....	14

### MISCELLANEOUS ARTICLES

The Flexibility of Truck Haulage.....	10
Take Your Repairshop With You!.....	11
Better to Lead Than Drive.....	15
Here and There with Motor Trucks.....	16
Safety Methods for Filling Stations.....	17
Do Not Over Estimate Your Costs.....	18

### DEPARTMENTS

The Better Way.....	20
Buyer's Department:	
White Business Car Designed for Salesman....	24
New 2-Ton Maccar.....	25
Truck Accessories.....	26
Shop Equipment for Fleet Owners.....	28
The Truck With the Giant Arm.....	30
Motor Truck Electric System Wiring Diagrams....	32
The Fleet Owners' Forum.....	33
Editorial: Do You Buy Time?.....	34

### NEWS

Wants Government to Help Highway Lines.....	35
President Signs Road Construction Bill.....	35
Trucks Force Lower Freight Rates.....	36
Bus Franchise Bids Opened in Saginaw.....	36
Federal Strike Plan Included Trucks.....	37
Bus Terminal Well Organized.....	37
To Establish Motor Transport School.....	38
Averages 21.9 M.P.H. Across Continent.....	38

Index to Advertisers.....58-59

## The Commercial Vehicle

Charles W. Blackman, General Manager

EDITORIAL DEPARTMENT

David Beecroft, Directing Editor

Sinclair Gluck, Managing Editor

F. Eugene Spooner, Technical Editor

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

Chicago, Mellers Building, 59 East Madison Street  
Detroit, 317 Fort Street West. Cleveland, 536-540 Guardian Bldg.  
Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law .....	.50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

## THE ZENITH CARBURETOR

*Has Been Used As  
Standard Equipment*

*for 7 years*

by **ATTERBURY  
ARMLEDER  
STEWART  
NETCO  
HALL**

*for 6 years*

by **FEDERAL  
DAY ELDER  
COMMERCE  
VIM  
WITT WILL  
FORSCHLER**

*for 5 years*

by **CLYDESDALE  
KELLY-SPRINGFIELD  
FAGEOL  
ROWE**

and by over fifty others for 1, 2, 3 and 4 years, BECAUSE—

It does its work well.

It gives power with economy.

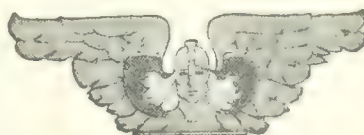
It is simple in construction.

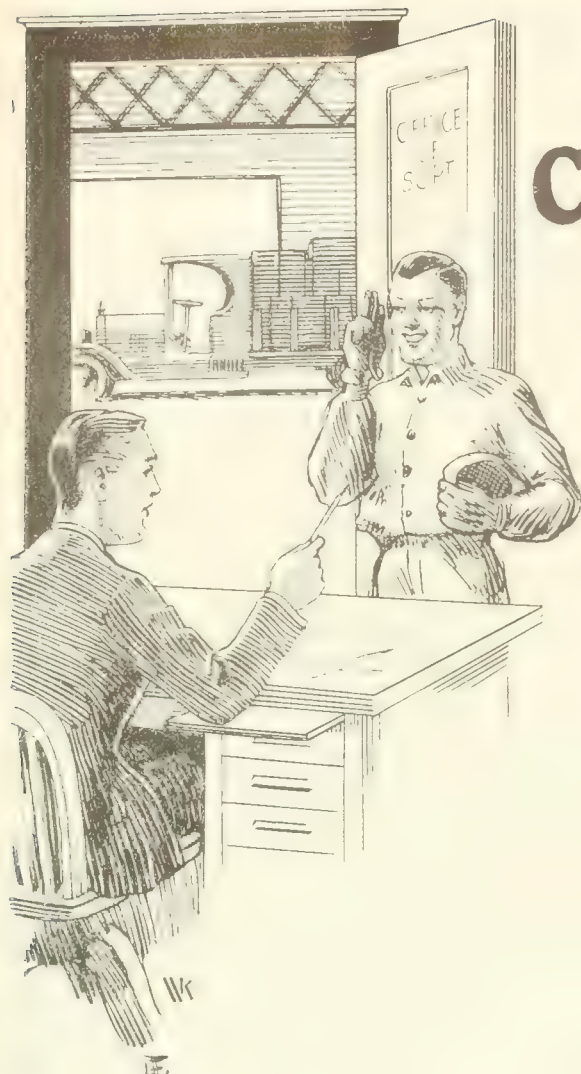
It cannot be jarred out of adjustment.

The truck-master can take control of the adjustment out of the drivers' hands.

*You can put ZENITH equipment on any truck. Write us or call our local branch or service station for details.*

**The Zenith Carburetor Co.**  
New York      Detroit      Chicago





# When Your Drivers Complain of Lost Power-

—when they tell you about getting stalled on hills or in rough going, it's time to check up on the valves—the most common source of compression leakage. It's two to one you'll find the valve faces and seats badly carbonized.

You can then do one of two things—have the valves ground and thus remedy the trouble *temporarily* or install FLEXEDGE Valves and thus *eliminate* the possibility of such trouble in the future. The installation of FLEXEDGE Valves is by far the cheaper way in the end. They will never need grinding, they will always hold compression and they will save fuel.



Cross Section of a Flexedge Valve

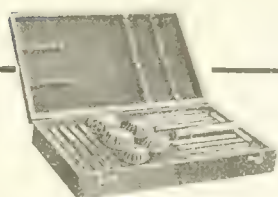
Note that the head is made of laminations instead of being one solid piece. When the head strikes the seat the edges of the laminations are flexed about  $1/1000''$ . This flexing action frees the seat of any carbon that has been deposited, thus permitting the valve to seat perfectly on every closing stroke. The result is an absolute compression seal with its saving in power and fuel.

Write for literature, prices and complete information.

**SELF-SEATING VALVE COMPANY**

340 W. Huron Street

Chicago, Ill.



## Flexedge Valve Tools

A complete line of cutter-heads, pilots and reamers. Chatter is eliminated by special design of the cutter-heads. Angle cutter and pilot always align perfectly. Finest tool steel used. All sizes—standard, standard over-sizes and special. Sold in sets or individually. Write for catalog.

# Flexedge

## VALVES You Never Need Grind



# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXV Nov. 15, 1921 No. 8

## **Do You Use Salesmanship To Sell Truck Haulage?**

*The Commercial Hauler Must Learn to  
Merchandise His Service Efficiently  
If He Wants His Business to Expand!*

**C**OMPETITION in the field of Commercial Haulage is already keen. But the small, or comparatively small, hauler has not yet realized that the transportation of his truck must be merchandised just as any product is merchandised—by efficient, up-to-date salesmanship.

The hauler must have something to sell on which he can base a selling talk. His operation must be organized to render a faithful, loyal trucking service at a reasonable rate. But when he has organized such a service he must learn to bring it to the attention of the prospective user of truck haulage in a light that will rivet the other's attention and convince him of the value of the service offered. This can only be done by good salesmanship.

Too often the truckman limits his selling talk to something like: "How about a little trucking today?" forgetting that there are many others in the same field that can say that much and say it as well.

The following two pages contain an article by a solicitor for a comparatively small trucking concern, who has nevertheless realized the possibilities of selling truck transportation and selling it right. Do not fail to read it.

# "Truck Haulage Competition Is Keen But Selling Haulage Is Neglected!"

## Experiences in Soliciting Haulage Accounts

By Albert H. Van Zandt\*

FROM a venturesome novelty, motor truck haulage is settling into an established business. It is regulated by more and more stringent laws and regulations. And it is facing keener and keener internal competition. *But unlike other similarly well-established businesses, it has not yet developed even the rudiments of real salesmanship.*

Most of the smaller truck haulers sit in their offices and wait for business to come to them. Some of the larger concerns employ solicitors to sell haulage, but I have noticed that even these men offer their trucking service with little or no imagination, allowing themselves to get into the rut of an entirely stereotyped plea.

In truth, as often as not, I have heard this offered as a complete sales talk: "How about youse fer a little truckin' today?"

### Insurance Experience

Some years ago, when I was selling life insurance, I came to the conclusion that there was a sugar-coated method of offering the agent's bitter pills. The method consisted of drawing a vivid word picture of the benefits of life insurance. This retained the prospect's attention until I had brought home to him certain vital facts and he was ready for the closing arguments.

In my search for new accounts for trucking, I have followed more or less the same plan. After a brief announcement of the object of my visit, I turn my talk toward some phase of the trucking business that is of exceptional and general interest, picking out an anecdote with a laugh in it that illustrates my point and retains the prospect's interest. He is then in the right frame of mind to accept the personal application of what I have to offer to his own business.

There is nothing new about this. It is simple salesmanship. But it has succeeded surprisingly, principally because I have little or no competition in my *salesmanship efforts*. Trucking concerns, except some of the very largest ones, do not use salesmanship at all in selling their haulage!

### Methods Which Succeed

The commercial hauler has a real service to sell. In many instances his truck-

less he takes advantage of the service.

In this article I shall attempt to give some of the methods that have succeeded in my experience.

In soliciting haulage, instead of contenting myself with a broad statement such as: "We will supply you with a service which will prove not only an economical one but a loyal and efficient one as well." I have made it a point to give actual examples of our loyalty. For example: "During the great snow storm of 1919 when traffic was completely tied up and demoralized for weeks, we established a record of faithful service that has been the means of holding our accounts steadfast since their inception. Notwithstanding the breakdown of our own trucks and the high premium at which all available rolling stock was held at that period, we succeeded in moving our customers' products and thereby saving many thousands of dollars, although this haulage was accomplished at considerable loss to ourselves."

### Other Examples

Here is another example: Because of lack of system in releasing goods from U. S. public stores, a truck is frequently made to wait as long as four or five hours before it can secure a shipment. A clever driver can frequently cut down this lost time, and I have many little anecdotes which prove it. One of these anecdotes will show the efficiency of our drivers and at the same time interest the prospect far more than any amount of general assurances as to our service.

Another example of our efficiency, I tell my prospects, is found in our discovery of a means of saving an account a considerable sum of money which would have been charged by the railroads for storage. And I illustrate my point with an actual instance.

These examples may seem of little help in selling haulage, but my experience has shown that just the opposite is true. The prospect, I find, welcomes these little



*This is Albert H. Van Zandt, treasurer and business solicitor for Cantwell & Wall, commercial haulers. Mr. Van Zandt's experience in selling insurance helped him to work out an efficient method of selling haulage. In this article he has a message for all haulage concerns, small and large*

ing service can be much more economical than the operation of owned trucks by the prospect. Of course his service must be a good one. It must combine efficiency of operation with loyalty to the prospect's interests. And it must embody reasonable charges.

But given that the service is efficient and reasonable, the next step is to sell it as such and convince the prospect that he is missing something worth while un-

\*Treasurer and business solicitor of Cantwell & Wall, commercial haulers.



stories of our service. He also likes to learn of other intimate details of our work—what we have done in the way of insurance protection for him; the kind of men that will handle his goods; the appearance of our trucks and their condition.

### Think for the Prospect

The solicitor should also think for the prospect and try to suggest arrangements which will be to his advantage. For example, where an account will involve the need of the exclusive service of one or more trucks, I find it quite an attraction to offer to supply a truck or trucks carrying if need be special bodies with signs advertising the firm name of the prospect. Only a few days ago I walked into a man's office where I was a stranger and closed a contract involving \$1500 a month, just on this selling point alone.

Then there is the matter of rates—hardly a simple matter to meet. For it depends upon the value of business and its type.

Until I have an opportunity of studying my prospect's shipping needs, I try to satisfy him with the more or less general statement that the cost will be as low as is consistent with the highest grade of loyal and efficient service. Also I state that my principal concern is to supply our trucking service at this economical rate so that he will not shortly wish to change to some other concern from whom he can secure a better figure.

### Follow-Ups on Prospects

The most efficient method for a solicitor of laying out a week's work is, I find, to make a list of the various industries and cover them separately. He can then use the experience gained with one prospect in a line of industry on the next prospect in the same line.

After the first personal interview, a series of pleasant but dignified letters follow up and keep our name before the prospect. The usual calendars and desk blockers with our name are used. We are also using a handy phone number memo booklet that hooks on the receiver stand and bears our name and tells of our service.

The lack of imagination at present shown in selling truck haulage is a reflection on the trucking industry. But it makes it easy for a small trucking concern to get plenty of business, provided they use their imagination and solicit the business as it should be solicited.

Some of the larger trucking concerns have solicitors. But even these men often content themselves with calling on prospect and asking him: "How about little trucking for you?"

The main thing to note is, that while competition for actual trucking service is quite keen, competition among small trucking concerns in efficient and imaginative salesmanship, with a grasp of what service may mean and may accomplish, is practically non-existent.

THOMAS CANTWELL  
DANIEL W. WALL

CANTWELL & WALL  
GENERAL FORWARDERS & TRUCKMEN  
ROOM 425 25 BEAVER STREET  
NEW YORK

TELEPHONE  
BRAD 3-660-2-667

BRANCH OFFICE  
416 W 40TH STREET  
NEW YORK  
TRL LONGACRE 8765

LOCAL & LONG DISTANCE HAULING  
PENNSYLVANIA AND  
NEW ENGLAND STATES  
VIA MOTOR AND RAIL SERVICE

November 7, 1921.

New England Forwarding Co.,

11 Broadway,

New York, City.

Attention Mr. Collins

Dear Sirs:

Following up the visit of our Mr. Van Zandt we are using this method of reminding you that our several trucks are "marking time" in anticipation of your commands.

Once again we assure you of the same loyal, efficient and economical trucking service that has made it possible for us to retain, from their very beginning, all of our accounts.

Let us have an opportunity of serving you and we will soon be fast friends.

Yours very truly,

CANTWELL & WALL

One of the typical follow up letters with which the firm follows up Mr. Van Zandt's calls on prospects. It will be noted that the letter is brief, is very much to the point, is cheerful and pleasant in tone and reiterates one of Van Zandt's selling points. Letters of this type would help many a hauler to build up a failing or stationary business



One of the Cantwell & Wall trucks engaged in commercial haulage. The truck is smart in appearance and in spite of the small available space on the side carries a good advertisement for the firm in a brief and dignified form

# The Flexibility of Truck Haulage

*Varying Loads, Long Hauls, Widely Separated Outlying Collection Points and Limited Equipment Do Not Prevent Efficient Truck Haulage of Milk Cans*

THE full advantages of haulage by truck are only brought out when the haulage conditions present what are apparently almost insuperable difficulties. Then it is that the truck shows most clearly its great advantage in flexibility, not only in its ability to run anywhere and take almost any route to get there, but in its flexibility of equipment. That is to say, a freight car is a freight car and travels full or light, according to the load available. But trucks vary in capacity and various trucks can be assigned to various jobs, according to the amount of goods to be hauled. Moreover, trailers have greatly increased this last type of flexibility inherent in the truck.

The experience of Ira Wilson & Son of Detroit is an excellent example of this. Ira Wilson laid the foundation of a successful business 6 years ago when, at the suggestion of his son, he adopted a motor truck to haul milk from Elm, Mich., to the Detroit Creamery. Now Ira Wilson & Son operate fifteen trucks from twelve different stations.

Some idea of the size of the firm's present transportation by truck can be gained from an examination of the following table:

Stations	Miles to Detroit	Average of Cans Daily	Stations	Miles to Detroit	Average of Cans Daily
Elm .....	18	100	Willis .....	36	270
Plymouth .....	32	200	Belleville ..	28	200
Perrinsville ..	19	50	Cherry Hill ..	28	35
Stark .....	20	20	Holland ....	13	35
Canton .....	23	65	Utica .....	25	180
Inkster .....	13	20	Milan .....	42	140

The chief difficulty of this haulage proposition over such a widely scattered territory and involving long runs of this type lies in the variation in the number of cans of milk brought in by the farmers each day. For example, a big Federal heavy duty tractor with a semi-trailer operates from Plymouth. The trailer will carry 204 cans of milk, which means a net tonnage of 11.2 tons. Of course, this is an effi-

cient arrangement, as the average load from Plymouth is 200 cans.

But on certain days the farmers have been known to bring in as many as 232 cans of milk, which is more than the semi-trailer can accommodate. When this happens, the flexibility of the truck service is shown. For it is a simple matter to put a 4-wheel trailer behind a truck operating out of Elm, a nearby town, and pick up the surplus cans with this truck and bring them into Detroit.

Willis is another good example. It is located 36 miles from Detroit and has an average of 270 cans daily to be hauled. On this account it presented quite a problem. But Wilson solved it. He arranged for three different trucks to start from Willis, carrying 90 cans each or only part of a load on each truck. After traveling 8 miles over a dirt road, they stop at Belleville. This station receives about 200 cans daily. But as 130 of these 200 cans are taken to Detroit daily by a fourth truck, that leaves about 70 cans to be picked up by the three trucks from Willis, making a full load for all four trucks.

Another truck leaves Cherry Hill with 98 cans, goes over 4 miles of dirt road and at Inkster picks up 35 cans which are hauled in from Canton by team over a very bad road. This load of 133 cans is then hauled to Detroit by the fully loaded truck.

As these figures show, the great need of haulage of this type is elasticity. Charles Wilson has so arranged the business that the entire haulage is taken care of with the least waste, and running the trucks almost always fully loaded, which cuts hauling costs. Such varying loads can be carried and carried economically by trucks, because the total haulage daily does not vary much. But it is unlikely that the same economical and prompt haulage could be accomplished in any other way or with any other type of transportation.



One of the big Federal trucks stopping at a collecting station to take on a big load of milk cans. It may be noted in passing that this loading platform was at one time evidently a loading platform for freight cars, judging by the tracks in the background



# Take Your Repairshop With You!

*A Repairshop on Wheels Fully Equipped with Both Tools and Machine Tools Saves Time and Money for This Road Building Firm When on Road Construction*

WHERE trucks return to the garage every night, a garage repairshop is certainly an economical necessity.

But unless repairs are to be farmed out, at higher costs, to local repairshops, what is to be done when trucks are out in country districts for days together? And even then, suppose there are no local repairshops capable of handling the work, as in the case of road work, far removed from any town?

This problem has been solved by the Kaiser Paving Co., a Pacific Coast road building firm. The company converted an 8-year-old Mack truck into a portable power plant which now renders excellent repair service.

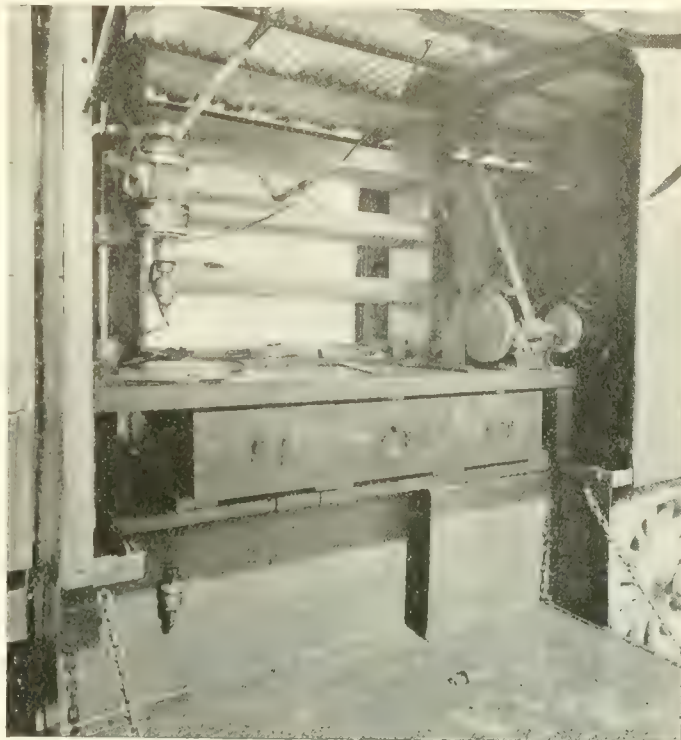
A special body was built for the truck and a completely equipped machine shop installed in it. For the operation of the machine shop, power is taken from the drive shaft, directly back of the cab to an overhead shafting, by a belt and pulley.

The equipment consists of an air compressor fitted with a tank and tubing for inflating pneumatic tires, painting by compressed air, driving rivetting hammers and other miscellaneous work.

There is also a 3-kw. generator which supplies electric current for a tool grinder, a drill press and a forge blower.

The shop is fitted with a collapsible blacksmith forge, drawers and receptacles for tools and supplies, electrical extensions for lighting the camp at night, an acetylene cutting and welding outfit and all kinds of hand tools such as are customarily needed in any machine shop.

When it is remembered that the crews and trucks and road building equipment work far from towns and stay on the job for days and weeks together, it can readily be seen what a big saving in time and money such a field repair outfit can mean.



*A close view of one of the repair benches in the body of the truck, showing the overhead shafting from which the power is taken to run the machine tools*



*A full length view of the traveling repairshop which carries full repair equipment to the job on which the fleet is working. Note the compact arrangement of the machine tools and the drawers for small tools and parts, making it convenient for the mechanics*

# The Truck Driver Legally an Agent

## *A Full Discussion of What the Driver Must Know and What He Must Do to Protect the Interests of His Employer. Do Your Drivers Know These Things?*

By Albert K. Weinberg

**T**HE truck driver, when away from the fleet owner's premises with his vehicle, is the sole executive and administrator of a part of that owner's property. Therefore, the instruction—the education—of the driver in the care of that property is essential to the fleet owner's best interests.

But the truck driver is more than an administrator of a part of the owner's property. He is the temporary representative of the entire business. Therefore, the education of the truck driver as to his duties and responsibilities, in so far as he represents the owner, is equally essential to the fleet owner's best interests.

In short, the driver must know, not only how to take care of his truck, but how to take care of the owner's business interests in so far as lies in his power and prerogative as the owner's agent.

### Owner's Agent Legally

The general neglect to instruct the motor-truck driver in the most essential laws concerning the receipt and delivery of goods at railroad terminals is responsible for the loss of much money and time to fleet owners every year.

The motor-truck driver is by law the owner's agent. His assent to any clause in a bill of lading, his signing a receipt, is as binding and decisive as the signature of the owner himself. In the light of this consideration alone it should be seen how fatal it is that the employee should be left completely in the dark regarding the matters he is negotiating.

The receipt and delivery of goods at carrier terminals is a procedure in the course of which many episodes involving legal points of issue may arise. To reckon on the driver's individual instinct to meet these situations is extremely bad policy.

### Designated Delivery Point

The simple matter of delivering goods at the railroad terminal appears entirely devoid of legal issue. But how many owners of motor-truck fleets have instructed their drivers, or even know themselves, that there is a *proper place* for the delivery of goods to the carrier?

The proper place is announced and defined by the railroad itself.

The important point is that if the goods are not delivered to the precise spot designated by the carrier, delivery to the carrier, from a legal point of view, cannot be regarded as having been made and the carrier cannot be held liable in the event of damage. For liability commences only upon proper delivery.

Moreover, proper delivery includes more elements than presentation at the right place. The carrier's agent must be informed that the goods are being tendered for transportation, and he must indicate an acceptance of the goods for transportation. The driver should not regard his task as completed till all three of these points have been met.

### A Case in Point

A case in which failure on the part of the driver to effect proper delivery caused loss of money to the shipper of the goods is that of *Grosvenor vs. N. Y. C. R. R. Co.* (39 N. Y. 34).

In this case, the railroad's freight agent was informed that the following day a servant would deliver the shipper's cutter and accompany it to its destination. The freight fare and the servant's fare were paid beforehand.

The next morning the servant brought the cutter as announced, and placed it on the freight house platform so that one end projected about nine inches beyond the end of the platform and over the tracks. Notification was given by the servant to the defendant carrier's baggageman, who was authorized to receive freight, that the cutter had been placed on the platform.

It was the announced custom to receive freight at another point at the east end of the freight house, after which it was taken into the freight house, weighed, and finally placed by the agent on the platform next to the tracks.

The projecting cutter was struck by a passing train and damaged. The court refused the plea of plaintiff for damages, on the ground that the defendant was not liable as a common carrier for the damage, since no real delivery of the cutter to the railroad had taken place. The agent, true, had been informed of the placing of the cutter on

the platform, but that did not constitute a valid acceptance of delivery.

### Carrier Was Not Liable

Since the cutter was not left in the proper place the agent was under no obligation to take charge of it, any more than if it had been left to lie on the railroad's tracks by the driver. Responsibility as a common carrier is not incurred until the railroad secures custody and control of the goods.

Another point in connection with this question of proper delivery is the indispensability of final shipping instructions to the beginning of insurer's liability. The carrier has the right to begin transportation immediately upon delivery of the goods, and when this right is withheld through neglect of the shipper to inform the carrier fully as to consignee or destination, the carrier cannot fairly be held to liability.

The driver should know this point, so that if it develops upon delivery of the goods that the office has failed to give the address either wholly or in part, he may recognize the necessity of obtaining the needed information immediately.

The most practical course for him in such a case is to telephone to the office from the railroad terminal and then address the shipment himself. If it is impossible to secure the address by telephone, he would be better to return with the goods than to leave them in temporary storage at the station. Should a fire take place while the goods are awaiting shipping instructions, not a cent could be recovered.

### "Shipper's Weight, Load and Count"

Another phase in the education of the driver concerning proper delivery is embraced in section 20 of the Pomerene Bill of Lading Law, which reads as follows: "That when goods are loaded by a carrier such carrier shall count the packages of goods, if package freight, and ascertain the kind and quantity if bulk freight, and such carrier shall not, in such cases, insert in the bill of lading or in any notice, receipt, contract, rule, regulation or tariff, 'Shipper's weight, load, and count,' or other words of like import, indicating that the goods



LANSING, MICH., May 27—The Lansing Bus Co. has recently been organized as State distributor with a complete line of special bodies for all makes of truck chassis.

# The Driver and the Idling Engine

*An Interesting Argument in Favor of Buying Trucks Equipped with Self-Starters or So Equipping Trucks. The Cost and the Danger of Idling Engines Explained*

By Edward Van Tassell

AS long as truck drivers are required to crank their engines, just so long will they persist in the habit of allowing their engines to idle while the truck is stationary, either loading, unloading or making deliveries.

There are many reasons why this is so. For instance, a driver may have a hard starting engine at all times, or his engine may be difficult to start when cold. As a result, he will probably have sore hands, which, of course, gives him a dread of cranking up. Moreover, a backfire is not an infrequent occurrence, and once a driver has broken his arm or received a blow from the starting handle through a backfire, he will not crank his engine more often than is absolutely necessary thereafter.

## Cost of an Idling Engine

One consecutive hour of engine idling costs, on an average, 1¾-gals. of gasoline. This may not seem very much. But if the engine of a truck idles an hour a day, it idles 240 hours a year, on an average, meaning a wastage of 420 gals. of gasoline at a cost of well over \$100. Moreover, the writer has noticed many instances where engines have been left to idle from 3½ to 4 hours in a single day. Therefore, where self-starters are not installed, the gasoline waste through idling in a year for a single truck is estimated very low at \$100. Nor should it be forgotten that this is just one truck. The fleet owner must multiply this sum of \$100 by the number of trucks he operates, to find the yearly wastage in this way of gasoline alone.

There is also the waste of oil;—not a particularly costly one perhaps, when thinking of one truck. But the whole fleet must be taken into consideration.

## Danger of Idling Engine

Then, too, there is the unproductive wear on costly material, such as pistons, cylinders, bearings and camshaft and timing gear assemblies. It is an unpardonable act of negligence to leave in operation, without the operator being present, any piece of machinery not automatically controlled for safety. Yet this negligence is a daily practice among

truck drivers whose trucks are not equipped with self-starters.

The writer has personally witnessed the results of a driver walking away and leaving his engine idling. In many cases a fan belt has broken or a water pump ceased to function, the water line has become clogged or the radiator has leaked, the spark has been left retarded, the gas mixture has been left too rich or a spark plug has fouled. As results, engines have been completely ruined, trucks have been destroyed by fire, and, returning to the smaller items, this negligence has resulted in burned-out bearings, ruined motor blocks, frozen pistons, leaking water jackets, leaking hose connections, scored cylinders, etc.

These are not chance happenings but everyday occurrences that can eat into, or are even now eating into, your profits. These happenings are perhaps reported to the fleet owner as originating in other definite or unknown causes, by his drivers. But nine times out of ten, the cause of repairs along the above lines is to be found in the driver's practice of leaving his engine running. Nor does the driver always have to leave his truck. The writer has seen drivers, asleep on their seats, awake to find things very radically wrong with the engines which they have left running.

## Another Danger in Starting

There is another dangerous practice which must not be overlooked, in considering the question of whether self-starters are indispensable. In many cases, a truck driver will practice the dangerous plan of starting the truck on a grade, allowing gravity to start his engine for him. Drivers delight in starting their engines by means of the momentum which a truck will pick up very quickly, on the slightest grade.

But this practice seems to have a very bad effect upon universal joints and the differential assemblies as well as clutches and transmissions. There are cases in which chain-drive trucks, through being started in this manner, have sustained broken chains, jack-shafts and gear sprockets.

Then, too, drivers sometimes have trouble keeping their engines correctly timed. Investigation often shows this to be directly due to this habit of starting the engine by means of a grade. A quick snap of the engine is sure to fol-

low the engaging of the clutch and this is, of course, felt by every loose connection. The magneto connection is bound to have the back-lash increased if this method of starting is tried often. This will make the timing too late or too early.

This careless method of starting and the resulting damage to the truck can also be avoided by the installation of a self-starter. The latter is the easiest way of starting the truck and will therefore be used by the driver.

## Self-Starters Dependable

The truck owner or superintendent cannot always be sure that his orders are carried out, when he is not present. And as long as truck drivers have the difficulties in starting mentioned above, they cannot be depended upon to stop their engines when the truck is standing, nor to start the engine again by means of the starting handle, no matter how many times they have been told to do so.

The self-starter, when properly taken care of, should be as dependable as the truck itself. Moreover, it is far easier to make sure that orders as to the proper care of the self-starter are obeyed, than to stop the drivers from leaving their engines running. For the truck returns to the garage every night, and there the fleet owner or his superintendent can inspect the self-starters and see to it that they are properly cared for and handled.

## To the Driver's Interest

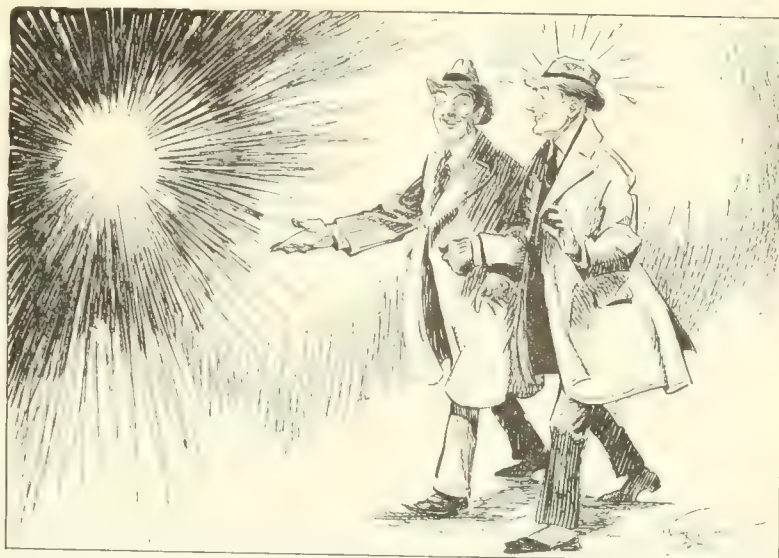
On the other hand, is it not probable that the driver will take a sincere personal interest in the care of an apparatus which means more comfort and less work for him, as well as a big saving to his employer? And there is very little care needed. The vital part is the battery. Good care of the storage batteries is the foundation on which the proper functioning of a starting and lighting system rests.

A self-starter on a truck will save a lot of money in gasoline, oil and repairs. But it will do more than that. It will materially cut down the cost of that truck per ton-mile. Every operator of trucks should consider these things before deciding as to whether his trucks shall or shall not be equipped with self-starters.



# It's Better to Lead Than Drive

By  
Sinclair Gluck



"ROSS," said Old Hammerhead, "What's all this discussion going on between you and Koenig down there?"

Silas Gunther, president of the big commercial house, or Old Hammerhead, as his men called him, leaned back in his chair and smiled at his superintendent while the latter sat down and ran his hands through his hair.

"Well," answered the garage superintendent, "It's just a little talk we've been having about the question of having trucks available when he wants them."

Old Hammerhead nodded. "Go ahead, Ross, and tell me about it," he said. "I'm not going to interfere in it in any case. I know Koenig and I know you. And I know that you'll straighten the thing out between you. But I'd like to hear about it anyway."

Ross shifted in his seat, a little uneasily. "Well, sir," he began at last, "The fact is that Koenig, as you probably know, has been needing quite a few of the trucks lately, from time to time, to make collections of different materials from different parts of town. All that work of the trucks is, of course, in addition to the ordinary delivery work that our fellows have to do."

"Yes, I know that," answered the old man.

Ross coughed in a deprecating way. "Well, sir, you see it puts quite a lot of additional work onto the drivers. But on top of that, it has meant some pretty close figuring, from time to time, on my part, to get all of it done on time with the vehicles we have. And it's only a temporary affair so I have not even considered the question of getting additional trucks to take care of it."

"Can you take care of it with the fleet we have?" asked the old man.

"Yes, sir, we can. Or at least we could, if Koenig would handle the thing the way I think he ought to handle it."

"How does he want to handle it?"

"Well, he wants me to have a truck, or even two or three trucks available at any time of day when he happens to want them, regardless of what the trucks may have to do on delivery work. In order to do that, I'd have to add at least two and probably three trucks to the

fleet. And as this business is only a temporary demand on our resources it would be a needless expense to buy more trucks."

"And how do you want to handle it?" asked Old Hammerhead.

"Why, all I want him to do is to plan his work ahead a little so that he can let me know at least a day in advance when he is going to need trucks and how many he is going to need. Then I could arrange the other work of the trucks in such a way that there would be trucks available for his use when he wants them."

Old Hammerhead nodded, "That seems reasonable. What does he say to that plan?"

"Says he can't do it, sir. Says that he sometimes doesn't know more than a few minutes in advance where he can get the stuff he is getting together. And he says that he has to send for it right away, as his time is limited. His idea is that the trucks are there to make collections when he happens to want them made and that if trucks aren't available when he wants them, why then there is something wrong with the trucking department."

Old Hammerhead leaned back in his chair and laughed. "And that did not make much of a hit with you, eh, Ross?"

Ross grinned. "Well, I'm doing my best to help him out with what we've got available. But I can't do the impossible. I can't have a lot of our trucks hanging around the garage on the chance that he is going to want them. The delivery work would never get done at that rate. And after all, that is the most important end of the duties of the delivery department. Our standing in the eyes of our customers depends more than a little upon the reliability of our delivery service."

Ross fell silent and the old man sat and drummed on his desk for a moment or two, before he spoke.

"Ross," he said at last, "Did you ever have anything much to do with animals? I mean with the care of horses, for example?"

"Can't say I have, sir."

"Well, I'll tell you. Horses are queer creatures. In some ways they are very

intelligent and in some ways they are very stupid. But in most ways they are very human, most of the time.

"I had quite a lot of experience with horses when I was a boy, and I found out one or two things about them. For one thing, if you want to lead a horse somewhere where he is not particularly eager to go, it's a 'good deal better to exercise a little patience and lead him gently along than to get behind and try to beat him or go yanking and jerking at the bridle until he gets mad himself and rears up and comes down, as like as not, on your toes. Of course some horses have to be driven. But most horses are very like people in that respect. Given a certain amount of good will and understanding between the horse and the man who is trying to get him to go somewhere, and a horse is a good deal easier to lead than to drive. And men are like that too, Ross."

"Yes," the old man went on, "If you have a good understanding with a man and have a difference of opinion with him, it's a good deal easier to lead him gently round to your way of thinking, than it is to drive him. The reason for that is, that if you make it easy for him to change his mind, he's a good deal more likely to do it than if you make it hard for him."

"We all have a certain amount of pride, Ross. It's a good thing too. And you know yourself, that if you've taken a certain stand and a man comes to you in a quiet, disinterested and impersonal way and puts a different view of the case before you, you're more likely to come round to his way of thinking—and tell him so—than if he backs you into a corner at the point of a gun and says: 'Come on now, you blame fool, do it my way'—eh?"

"But I didn't—"

Old Hammerhead laughed. "Yes, you did, Ross. I heard the argument. You were annoyed and you showed it."

Ross grinned again. "Yes, I guess I was, sir. Koenig is a pretty reasonable fellow. I'll tackle him again your way."

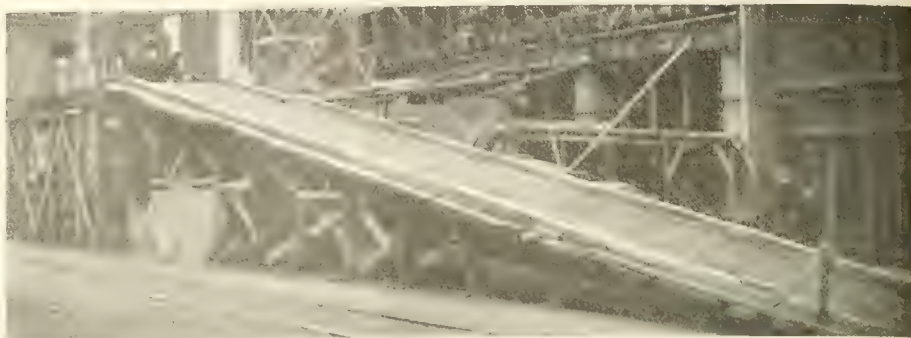
"That's right, Ross. And let him think he's changed his mind all by himself! Then tell him you agree with him!"



# Here and There With Motor Trucks

## Trucks Dump Direct Into Portable Bunkers

*These portable bunkers, used in San Francisco building construction, are placed at such a height as to permit the motor truck to pass up an incline and dump the aggregate of sand and crushed rock directly into the bunkers. The bunkers can be quickly dismantled and set up again on another job*



## Setting a Good Example for Mere Men

*To collect funds for Simmons College, these girls leased a 2-ton truck and traveled the East, visiting fairs and other gatherings and selling goods which they had made themselves. All the profits go to the college. One girl drives and takes care of the truck, and the smartness of the vehicle is a good example for any driver to follow in the care of his own truck*

## Unique Advertising Value in This Vehicle

*A unique delivery body used by a San Francisco shoe store. The shoe is 9 1/4 ft. long and was built by cutting the form out of oak blocks which were glued together. The surface of the wood is covered with canvas which is painted to appear as near as possible like Cordovan leather. The toe of the shoe can be raised to give access to the engine of the vehicle*

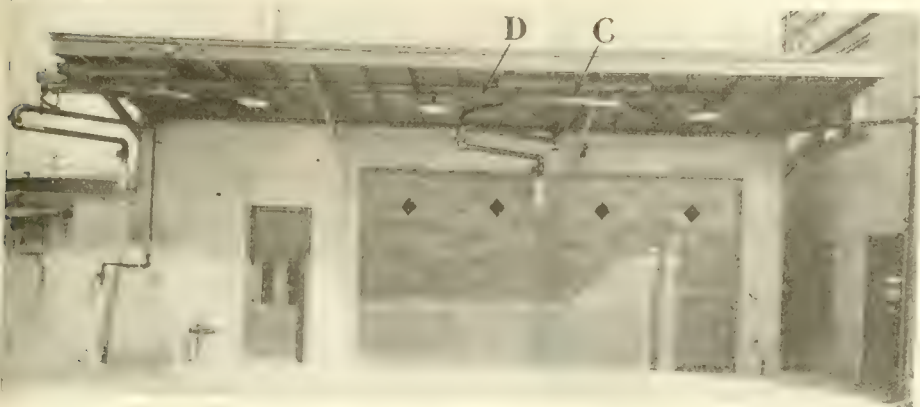


## A Very Big Vehicle for a Very Small Product

*A 5-ton White truck with a 5-ton Troy trailer attached, used by the Fleischmann Co. from the Washington factory to the Baltimore branch. The truck makes the trip daily, carrying 5 tons of yeast on the trailer and 5 tons of vinegar on the truck. The trailer has an insulated refrigerator body equipped with an automatic brine circulation system which maintains a temperature of about 40 degrees*



# Safety Methods for Filling Stations

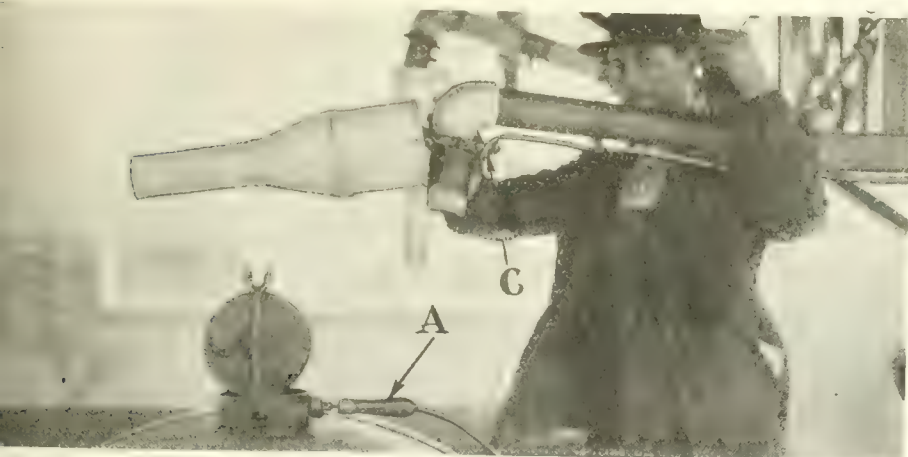
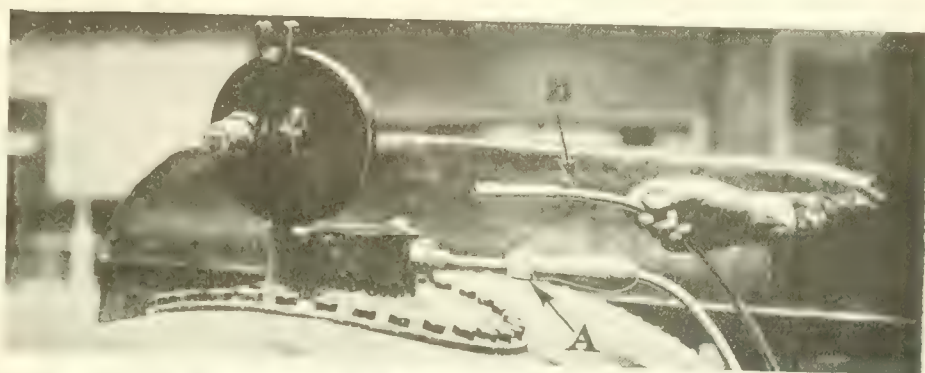


## No "Spotting" Necessary With This Circular Track

The S. T. Johnson Co. of Oakland, Cal., has recently completed a new storage plant for oil, with a carefully planned loading equipment. This view shows the circular track, C, which carries the weight of the discharge pipe by means of the pulley, D. This adds to the elasticity of the discharge pipe and makes it unnecessary to "spot" the truck

## Here Are the Two Ends of the Safety Device

In this view are shown the two ends of the safety device which leads off static electricity from the tank body and prevents a spark from setting fire to the oil or gasoline. The end which is inserted into the top of the tank, A, also unlocks the filler cap. The other end, B, is grounded on the iron work of the filling station and so carries off static electricity from the tank body on the truck

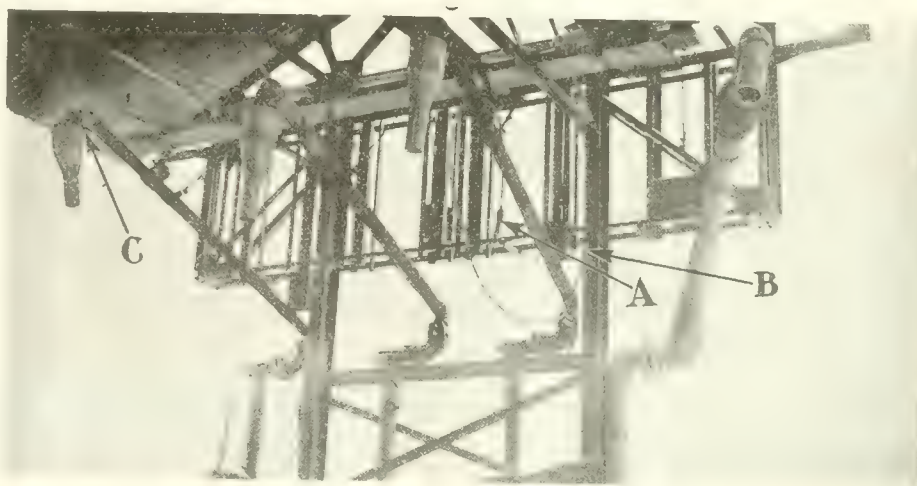


## Plug and Wire Which Ground the Filler Pipe Also

Static electricity must not only be drawn off from the tank body on the truck but from the filler pipe also. This view shows both the safety wire, A, running to the top of the tank body, but also the safety wire, B, which grounds the filler pipe from which the tank is filled. This wire runs to and is grounded on the iron work of the filling station

## Grounding Apparatus on the Filling Station Also

This view shows how the apparatus is arranged on the filling station. The arrow at A shows the loose end of the wire which grounds the tank body and unlocks the filler cap. B is the other end of this wire, grounded on the iron work. And C shows the location of the wire which grounds the filling pipe, the other end of which is also grounded on the iron work of the filling station as shown in the illustration



# Do Not OVERESTIMATE Costs!

*These Costs Are High Because the Truck Has Operated With Small Loads; But the Costs Have Been Overestimated Also in Three Cases*

IN most types of haulage great economies can be effected by proper selection of vehicles, good supervision and careful cost keeping. But even in haulage where speed is all-important and full capacity loads cannot be attained, it is still possible to economize by means of selecting the right type and size of vehicle and then keeping careful costs on it.

This is interestingly shown by the experience of Wallace Stebbins & Sons of Baltimore, a concern handling machinery and supplies of various kinds, including pipe fittings, valves and other equipment for stationary power plants.

They are also steam fitters, machinists and boiler makers, specializing in alterations, additions and repairs. This work is done for concerns of various kinds, including office buildings, factories, mills and shipyards. A great many of the customers have large machines which require repairs at rare intervals. For that reason they cannot afford to keep on hand the skilled mechanics and special tools required for these occasional jobs.

## Is Really Breakdown Truck

Because they specialize in such work and keep on hand all necessary tools and machinists for doing it, this firm can handle such work efficiently and well. But because the firm's service is required in the event of a serious breakdown, it must stand ready for immediate service and this means that the truck which carries the machinists and their tools to the job must be available immediately. In this sense it is a breakdown truck and can make no attempt to run fully laden.

Prior to 1918, all the firm's hauling was handled by team. Then a 1-ton truck was purchased. But in May, 1920, a 1½-ton truck, a Selden, was bought, as it could better handle either light or heavier loads, as occasion required. Most of the loads are only a few hundred pounds. But sometimes they approximate 2 tons. If the load happens to be a heavy one—5 tons or so—it is cheaper to hire a truck to haul it.

This truck runs to different customers all over Baltimore and vicinity and brings small machines back to the shop for repairs. After the repairs have been made, it hauls the machinery back to the customer. About half of the work, how-

ever, is done outside of the shop, on machines that are too large to move. In such cases, the truck takes the necessary tools and workmen to and from the job. It often carries as many as ten men, but two or three is the more usual

number of men on one of these jobs.

The records of the truck show that, for the 11 months period ending June 1, 1921, it operated 280 days, made 1902 deliveries or pick-up stops and traveled 7566 miles. It hauled 817,239 pounds

The Commercial Vehicle—Truck Cost System			
11 Months ending June 1, 1921		Gasoline <u>Selden</u>	
Make of truck <u>Selden</u>		Gasoline <u>Home</u>	
U. P. C. BOOK COMPANY, INC. 243 249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline	42 gals.	@ \$ 3.20	\$ 134.40
Current	kw h	@	
Oil	53.2 qts.	@ \$ 3.75	\$ 199.50
Grease	bs	@	
Kerosene	gals.	@	
Waste	lbs	@	
Dist. Water	gals.	@	
Driver	280 days	@ \$ 3.12	\$ 873.60
Helper	days	@	
Mechanic	hrs	@	
<b>A—Total Operating Charges</b>			\$ 1,242.36
<b>Maintenance Charges</b>			
Tires	7566 miles	@ \$ 4.25 per 1000	\$ 320.82
Repairs		Estimated @	\$ 325.83
Overhauling, painting, etc.		@ \$ 350 per year	
Spare vehicle rental		@ \$ 5 per week	\$ 118.10
Garage rental (pro rata)		@ \$ 5 per week	
<b>B—Total maintenance charges</b>			\$ 764.75
<b>Fixed Charges</b>			
Insurance, fire		per year	\$ 30.33
Liability		per year	
Depreciation on chassis		per year	
Depreciation on body		per year	
Depreciation on equipment		per year	
Depreciation on tires		per year	
Total taxes and licenses		per year	
<b>C—Total fixed charges</b>			\$ 1,133.33
			\$ 3,140.44

\*Note: Omit one of these.

Complete cost figures for a period of 11 months laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks. The truck is a Selden, engaged in rushing men and machinery to repair jobs, where large engines have broken down. On this account, the costs are high, because it has not been possible to work to anything like rated capacity



out of the plant and 499,425 pounds into the plant, making a total of 1,316,664 pounds or 658,332 tons hauled for the entire 11 months period. It was not laid up for a single day.

This tonnage hauled works out at an average of only .5509 tons hauled per round trip, which is way below capacity, of course. But the nature of the business makes speedy delivery very important. When the firm's services are required, it usually means that some important machine is laid up and must be fixed in a hurry, because it is holding up production. This means that the truck must get away at once without waiting for a full load for some other job and that the truck must make good speed.

The firm has found the truck much faster than horses, although the team has some advantages in a crowded freight yard. Moreover, the adoption of

motor trucks has brought a material increase in business. Some of this increase is probably due to the fact that the firm

now makes deliveries free of charge, whereas it used to charge for deliveries.

### Truck Guarantees Service

The firm feels that the present policy of free deliveries is very much better. But more important still, a dependable truck enables the firm to guarantee deliveries—which was impossible with horses. Moreover, the truck can be kept on the job all the time—another feature impossible with horses—and this one feature is all important to the business because of the importance of fast and dependable delivery service, where hurry calls for repairs are answered.

Being experts in keeping machinery in repair, the firm figured that it should be able to operate the truck for at least 5 years and are depreciating it on that basis. Actual repairs to date have been only about \$20 and it is estimated that repair and painting, etc., should not exceed \$350 per year over the entire period. This seems high, but the truck is kept in the best possible condition and is frequently painted with the best quality paint, in view of its advertising value.

### Cost Keeping For All

The Standard Cost Keeping System for Motor Trucks, published by THE COMMERCIAL VEHICLE, has always been sold at cost price.

But now, in order to enable fleet owners new to the industry to install an accurate cost keeping system at the lowest possible cost, the price of the system has been still further reduced.

The entire system now sells for \$7.50, instead of \$12.50, as before.

### This is Your Chance!

#### The Commercial Vehicle—Truck Cost System

Number of Truck

Capacity in lbs. 5,000

Chassis No.

MONTHLY COST SUMMARY SHEET

U. P. C. BECK COMPANY, INC. 243-245 WEST 10TH ST. NEW YORK

#### Investment

Cost of chassis, less tires	Complete	\$ 3,975.31
Cost of body		
Cost of equipment		
Cost of tires		34.46
1 - Total cost, complete		\$ 4,415.27

#### Performance Record

2 - Days operated		280
3 - Days idle		55
4 - Days maintained Item 2 Item 3		335
5 - Total hours operated		2,240
6 - Total miles covered		7566
7 - Total trips made		1145
8 - Total tons or packages or stops	3166.64 tons	658,332

#### Performance Averages

9 - Average miles per day maintained (Item 6—Item 4)		22.54
10 - Average miles per day operated (Item 6—Item 2)		27.02
11 - Average miles per trip (Item 6—Item 7)		6.33
12 - Average tons, stops or packages per trip (Item 8—Item 7)		.5504
13 - Average commercial ton miles, package miles or stop miles per trip	(Item 11 x Item 12) / 2	3.487

#### Recapitulation

14 - Total expenses for month (Sum of Items A, B and C)		\$ 3477.34
15 - Cost per day operated (Item 14—Item 2)		12.42
16 - Cost per day maintained (Item 14—Item 4)		10.33
17 - Cost per mile operated (Item 14—Item 6)		.46
18 - Total commercial ton-miles, package miles or stop miles (Item 7 x Item 13)		467.2
19 - Cost per commercial ton-mile, package mile or stop mile (Item 14—Item 18)		\$ 834.5
20 - Cost per ton	(Item 14—Item 5)	\$ 5.282

### Interesting Cost Results

The truck cost \$3,477.34 for the entire period. Thus it cost \$12.42 per day operated, \$.46 per mile operated, \$.8345 per ton-mile hauled and \$.5282 per ton hauled. This last cost is very high for a 1½-ton truck, making about 4 trips per day and costing only \$12.42 per day to operate. But the truck carried a total average tonnage of only a little over half a ton, including both the outgoing and the incoming trip, which sent up the cost per ton very materially.

The estimation of the costs on the truck has not erred on the side of underestimation. If the firm has both machinery and mechanics available anyway, for making repairs, repairs on the truck during the last two years of its life would have to be very extensive indeed to bring the total up to a yearly average of \$350, when the overhead cost for machinery and mechanics would be so low.

The depreciation item is figured on a mileage life of only 40,000 and as many trucks run 100,000, 200,000 and even higher mileages before they are scrapped, this too seems to be a very high estimate.

### Interest Charge Too High

Finally the interest charged against the truck is very much too high. In the first place, the usual charge is 6 per cent, not 7 per cent. But more important than this, the interest has been charged at the full rate for the entire period.

This is incorrect. The truck is being depreciated at the rate of 1/5 of its value each year. That is, it is paying back 20 per cent of the original investment each year. The interest should thus be charged on this lessening investment instead of on the full amount, making the yearly charge about \$170 instead of \$283.31.

Recapitulation of the costs shown on the opposite page. The truck operated 280 days out of the 335. But while it is a 1½-ton truck, it only averaged a little over half a ton per trip. This brought down the average commercial ton-miles per trip to only 3.487 per trip. The total expenses for the period are high, also, because Interest, Depreciation and Repairs are too high

# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 617—Placing Keys in Valve Stems

IT is often very difficult to place the horseshoe keys in valve stems. This work is simplified by the use of a No. 2 cotter key. Spread it over the horse shoe key. It can then be easily placed in the valve stem slot.—F. W. SHEETS, Russ Bros. Ice Cream Co., Harrisburg, Pa.

## No. 618—Borg & Beck Clutch Cover Removal

BLOCKS of wood are placed between the bearing and the clutch cover while the cap screws are removed, the block taking the thrust of the spring. The blocks may be left in this position until the clutch is assembled again.—R. G. DASSE, Burlington, Vt.

## No. 619—Painting Grease Cups

SOMETIMES truck drivers have trouble locating all of the grease cups during the period set aside for truck lubrication and greasing. By painting the grease cups red, the driver or mechanic has less difficulty in getting them all filled, for the bright color will enable him to easily locate those cups that would perhaps be passed by.—F. W. SHEETS, Russ Bros. Ice Cream Co., Harrisburg, Pa.

## No. 620—Getting Lubrication to Inaccessible Parts

THERE are some parts on a truck that are very hard to oil or grease on account of being in some out of the way place. The illustration shows how to improve lubrication facilities on a brake mounted on the driveshaft. The simple fittings consist of 1/8-in. iron pipe or copper tubing fitted with compression couplings.—H. MAYER, San Antonio, Tex.

## No. 621—Steering Connection as an Engine Lifter

THE yoke type of steering connector in the tie bar of a motor vehicle steering gear can be used in conjunction with one of the cylinder head bolts for attaching the crane or hoist hook in swinging an engine in or out of a truck. This arrangement is shown in the accompanying illustration.

The bolt is fitted or screwed into one

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks. THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

of the bolt holes in the middle of the block, and the engine can be swung about on this pivot and rested on the bench in the desired position. Apart from being an inexpensive contrivance for lifting, it is simpler and more convenient to attach than chain, cable or rope.—FRED TODD, Chicago.

## No. 622—Zenith Carbureter Tester

A MANIFOLD is mounted on a board with a tank and necessary tubing. The carbureter is then attached to the manifold. The float level gage which is furnished by the carbureter manufacturer is next attached. This is marked so that it will be possible to determine whether the level is high enough or not.—C. R. SIMMONS, New York City.

## No. 623—Handy Tools for Repairshop

THE accompanying illustration shows several tools which will prove very handy. One is designed for unscrewing the valve caps on some Continental engines. The tool has two screws, one to fit the 3/8-in. S. A. E. spark plug hole and the

other a smaller thread to fit the 1/8-in. pipe thread hole for the priming cock. The dimensions are very close to actual measurement.

The 3/8-in. screw is only shown, the 1/8-in. size being the same except for the thread end, which tapers down to the 1/8-in. pipe thread size. Although there is not much choice between them, the former tool is the more valuable.

The other tool is designed for the removal of valve springs. To make, take about 1 ft., for generous measure, of 3/4-in. angle iron and also purchase a pair of ordinary stamped steel valve lifters at any good accessory store. Cut two pieces of angle iron 4 1/4 in. over all. Next, cut out a 3/4-in. section from the side of one of the pieces, as roughly indicated in the sketch. Now have the tipped ends bent over at right angles and welded to the ends of the short angle. Then weld the tip of the spring lifter to the sides of the two pieces, as shown in the other sketch.

File out with a round and half-round file the top and bottom ends of the forward angle iron so the valve stems can be put through the spring. To use, compress the spring and washer in the vise, using a piece of keystick between the vise jaws and spring so the spring can be caught in the tool. Close the jaws over the spring after it has been sufficiently compressed and released from the vise. The spring will now be held in place in the tool, ready for application to the valve.—W. E. MARKLE, Lincoln, Neb.

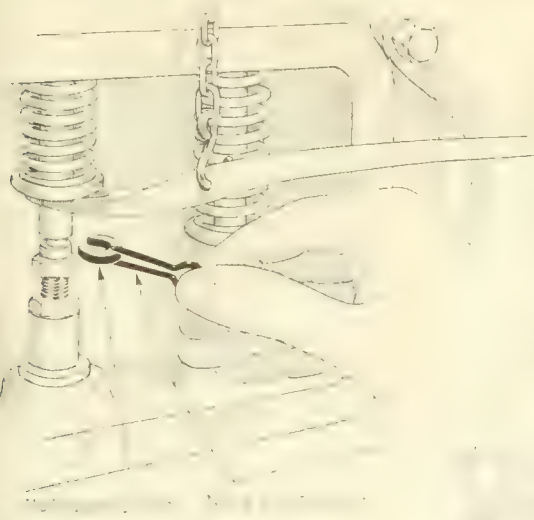
## Sees Motorization of Interurban Cars

CLEVELAND, Nov. 8.—At the general offices of the White Co. the prediction was made that in the immediate future there is to be a great development of business with certain public utilities that are now operating their cars at a loss with electricity.

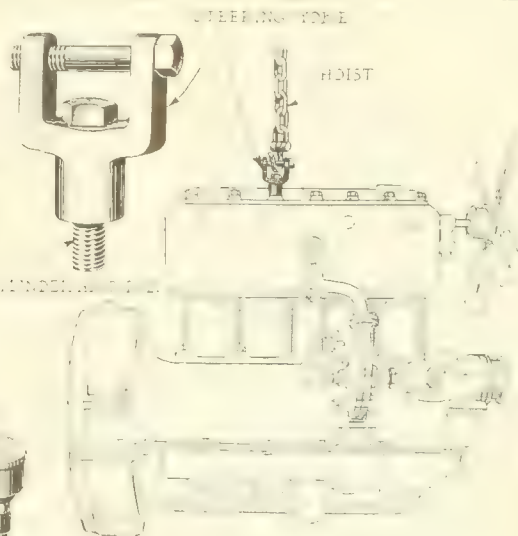
The motorization of the interurban systems of the country at no great future date was predicted and, in substantiation of the prediction, White officials said that many inquiries are being received from interurban companies about types of engines that could be used and the cost.

It costs about \$3 a mile to operate an interurban car with electricity, while it can be done for less than a dollar with a gasoline engine, according to statements made at the White company.

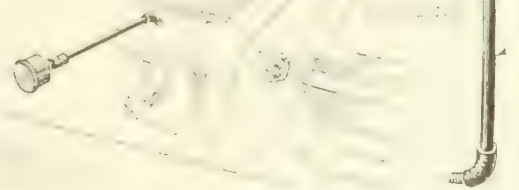




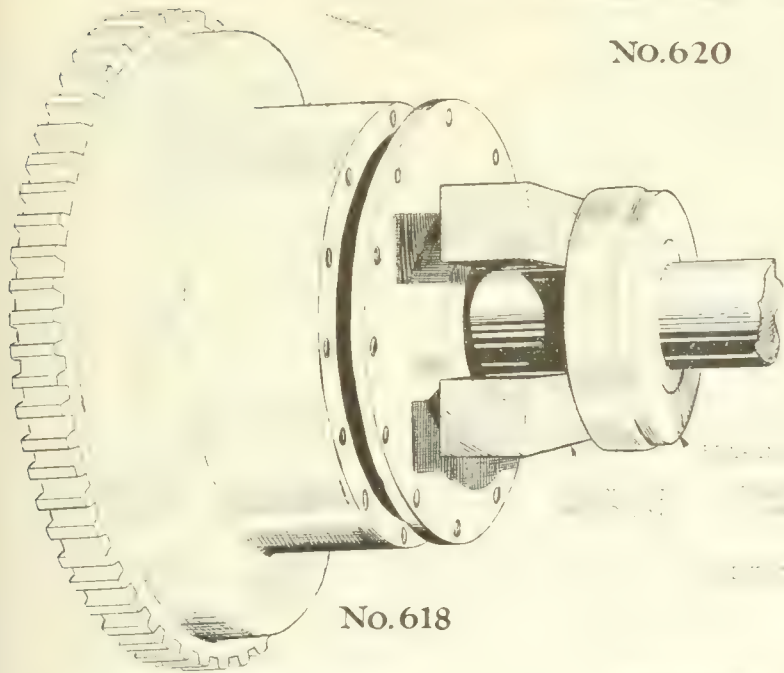
No.617



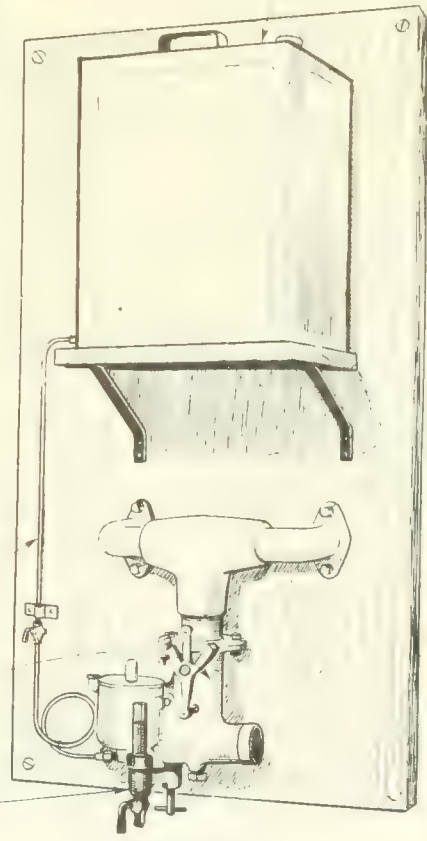
No.621



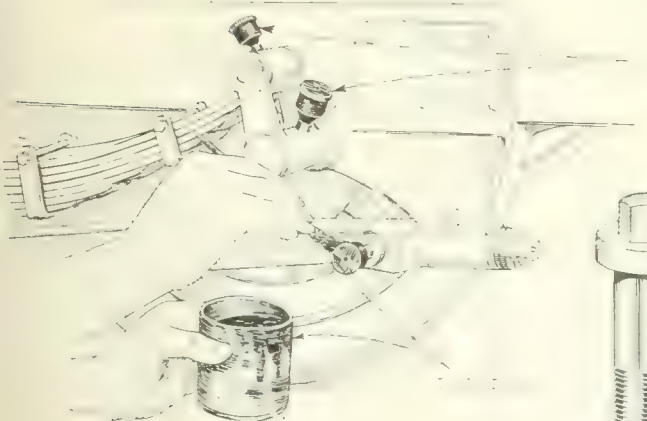
No.620



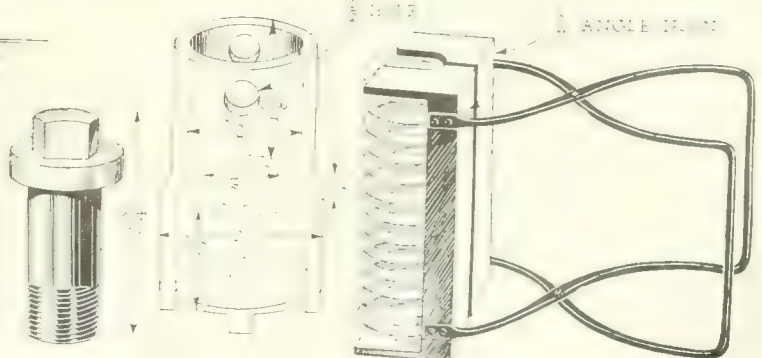
No.618



No.622



No.619



No.623

### No. 624—Oil Can Holder for Shop Use

**I**F OIL CANS or other cans of lubricating oil are difficult to handle, that is, to tip for the purpose of emptying out a part of their contents. To make it easy to pour and avoid the waste occasioned by overflowing of the oil when the can is not held rigidly, a convenient fixture made from several pieces of plank is shown in the accompanying sketch.

The crate is made to the outside size of the can, and the pivot is placed about half way to the top of the crate. A double-ended hook is stapled to the side of the crate and adjusted so that it may be turned into position, engaging one support and holding the can in an elevated position until it is desired to tip it for pouring. This holder is set on one edge of the work bench, preferably the end, where it is most convenient.

With the aid of this simple fixture it is easy to measure out quarts, pints or even fill oil cans without waste, as the heavy can is always under perfect control. A similar apparatus will be found convenient for mounting acid carboys.—E. SWAIN, Syracuse, N. Y.

### No. 625—Old Pistons Used for Washer Punches

**T**HIN washers, required in repair work to take out play and resultant rattle from parts of the running gear and to place under nuts to bring cotter pin holes in line, can be made with the aid of two old pistons modified, as shown in the sketch. A slot is sawed as one of the bosses for the wristpin, one of the wristpins being used as a punch after grinding the end squarely sharp. The inside of the washer is cut with one size wristpin while the outside is cut using a larger piston and wristpin.

The wristpin which cuts the outside circle is fitted with a plug or mandrel which centers in the inside diameter and makes an even washer. To seat the pistons on the bench, one side or what corresponds to the bottom of these improvised punches is faced flat on the grindstone. Though these pistons are fitted with brass bushings, they will cut quite a few washers without dragging the edges if a sharp quick blow is given to the wristpin punch. Substituting steel bushings at the cutting face improves the punch and makes it last a much longer time.—J. MCARGLE, New York City.

### No. 626—Plugs from Main Line for Night Work

**I**N a garage where there is occasion for much night work, it is often necessary that a large number of plugs be installed for lighting and other purposes. The accompanying illustration shows one way in which to make use of a large number of plugs from one line. A wooden case covers the wires.—J. BERGER, Gobel's Garage, Brooklyn, N. Y.

### No. 627—Tool for Removal of Dents

**T**HE tool illustrated herewith is used for removing dents or buckles from the bodies or tanks where the opposite sides of the dents are not accessible. It consists of a piece of sheet brass about 1/16-in. thick, 4 in. wide and 6 in. long, to which an ordinary heavy drawer handle is riveted solidly. The opposite face of the brass is heavily tinned with solder.

In repairing a dent the center, for an area the size of the brass, is scraped off and cleaned with soldering acid. The brass is then bent to conform to the surface of the dent and the tool is sweated on with the aid of a blow torch.

One mechanic pulls hard against the handle and another strikes lightly with a leather-faced mallet all around the dent, in a circular series of blows. The dent will invariably respond to this treatment and the metal come back to its former shape. The tool is then removed by heating thoroughly with the torch and the solder is wiped off the body while hot. Some body enamel of the right color then is applied, and the job is complete.—R. WOOD, Newark, N. J.

### No. 628—Spring Paper Clip for Tube Repairs

**A** CONVENIENT way to hold the tube while the surface is being scratched clean or while the cement is drying and the patch applied, is to make use of a spring paper clip, used in offices for holding several papers together in files.

Grip the tube to the edge of one of the fenders by means of this spring fastener and the work of patching can proceed without loss of time or work. These clips can also be used advantageously in setting a blowout patch inside a tire. Place a clip in the furthest edge of the flap which goes over the bead of the tire next to the car. This will hold the flap outside the tire until the casing is entirely on the rim. Without this, the flap frequently gets inside, and much work is needed in removing the tire to get the flap outside.—H. STEELE, Grand Rapids, Mich.

### No. 629—Mirror for Reflecting Light on Bench

**P**LACE a mirror on the wall back of work bench and let it hang in position to reflect the light from a window on the vise and it will be a great help when doing close work.—N. S. BEEBE, Beebe Storage & Moving Co., Kansas City, Mo.

### No. 630—Preventing Drill Breakage

**S**MALL drills are broken off long before they are worn out in service, and apart from their cost it is sometimes difficult to replace the various sizes without sending out of town for them. To avoid premature breaking of drills, use a piece of hardwood over the flutes with

only the required amount of the point protruding. This piece of wood once placed on the drill can be left there after the drill is removed from the brace or chuck and is at hand each time the drill is used. This protector is made from a hard chair rung or similar piece. Aside from the loss of breaking the drill the point often sticks in the hard steel and its removal is difficult. With the sleeve on the point, the bending of the drill with the resulting breakage is avoided.—D. JAMES, Des Moines, Iowa.

### No. 631—Installing Clutch or Brake Tension Spring

**A** CLUTCH or foot brake tension spring cannot be put on without considerable trouble. By taking a piece of pipe to fit over the rod the spring is to be installed on and then placing loop of spring over the rod, it will be possible to slide the spring along until finally it is forced on the place desired. The pipe must have 1/2 in. sawed off one end in order to get a grip, as shown in the sketch.—W. WIPPER, Gobel's Garage, Brooklyn, N. Y.

### Exide Opens Chicago Garage

CHICAGO, Nov. 5.—A modern equipped electric garage for the accommodation of electric trucks and vehicles has been opened by the Electric Storage Battery Co. in Chicago. This garage, which is located in 25th Street, is large enough to accommodate forty trucks and will be for the exclusive use of electricians.

There are forty charging circuits on the switch-board allowing each truck its own individual charging circuit. Thus, it will not be necessary to hurry one truck off charge in order to make room for another vehicle.

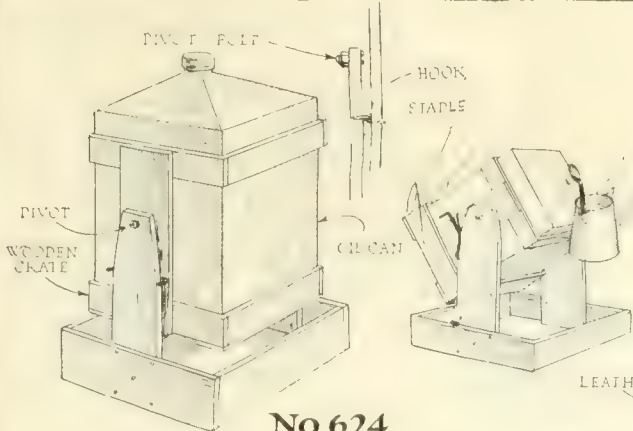
Considerable care will be exercised at the new Exide garage to have all charging done according to the instructions furnished by the battery manufacturer of the particular battery with which the truck is equipped. Though this garage is operated by the Electric Storage Battery Co., manufacturer of Exide batteries, it has been established in the interest of service for electric trucks, and any truck will be garaged regardless of make of battery. For boosting at high rates, two charging circuits with a capacity of 300 amperes have also been installed.

The new garage covers 10,000 square feet, is airy and well-lighted and in every way conforms to the requirements for a modern electric garage.

### Buses Popular in the Carolina

SPARTANBURG, S. C., Nov. 10.—Motor bus lines are popular in the Piedmont section of the Carolinas. There are five lines actively engaged in hauling passengers to this city from points within a radius of 45 miles. On an average over 500 people are brought each week to Spartanburg. The merchants in the city appreciate this influx of potential buyers. The fare from points 40 miles distant is \$1.50 per round trip.

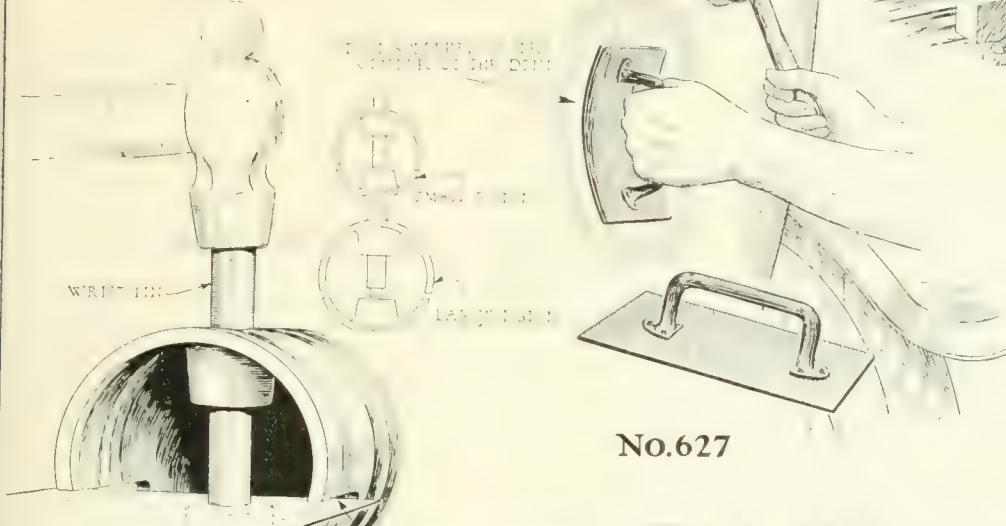




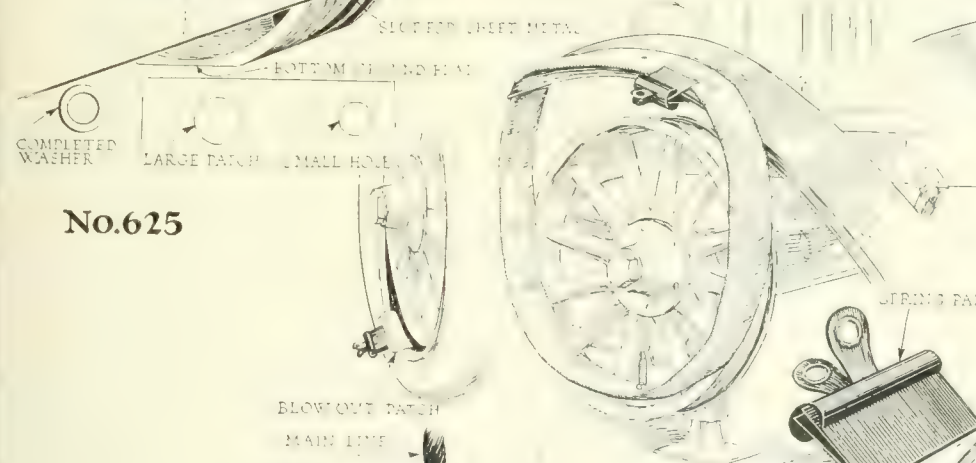
No.624



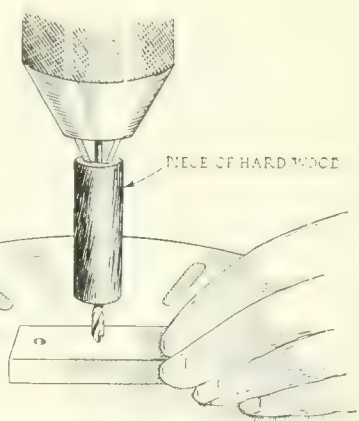
No.629



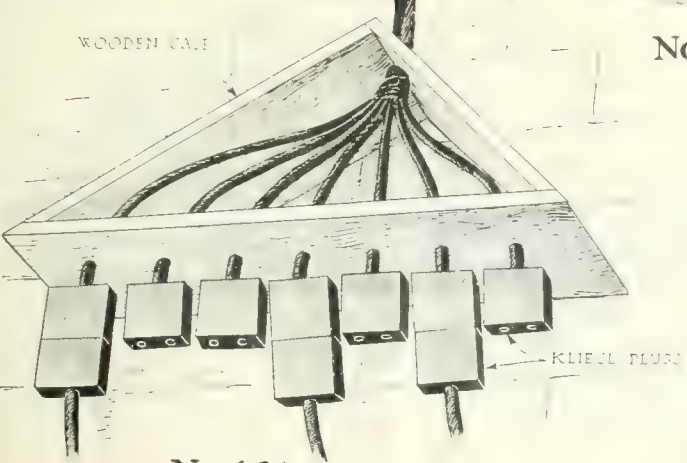
No.627



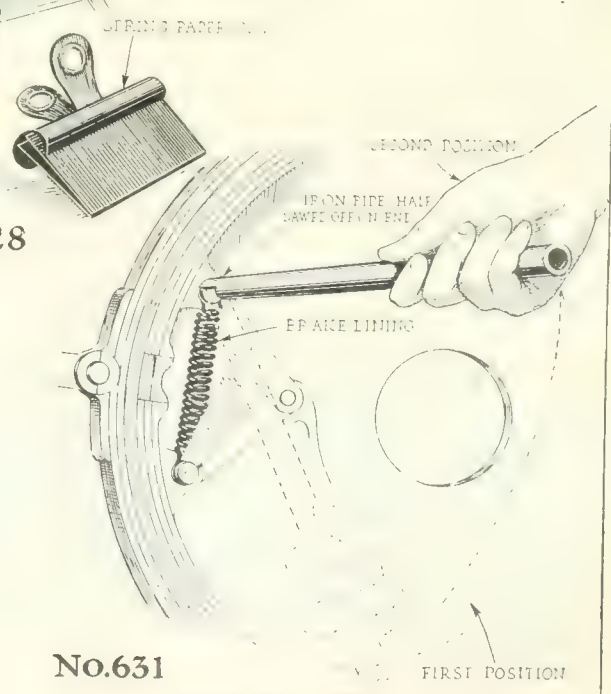
No.625



No.630



No.626



No.631

## Buyer's Department of The Commercial Vehicle

# White Business Car Designed for Salesmen

**Chassis of Truck Construction—Rear Compartment May Be Fitted to Accommodate Whatever Business Equipment the User May Have to Carry**

### WHITE SPECIFICATIONS

Price	...\$3,225
Wheelbase, in.	119
Tires, front	4 x 14
Tires, rear	4 x 14
Body, in.	54
Stroke, in.	3.5
N. A. C. C. hp.	22.5
Final drive	Direct Bevel

THE increasing use of passenger cars by salesmen and others whose duties make it necessary for them to travel over sparsely settled territory has prompted one large truck company, the White Co., Cleveland, to build a special car for this class of work. The White Business Car, as this model is called, is a development of the White taxicab, the chassis being of truck construction. It is understood that the White Co. will not re-enter the passenger car field again, and this new model comes in a strictly business class and will be merchandised as far as possible in multiple units or fleets.

A business car of this type has made

it possible for the salesmen to double and sometimes treble their calls per day. The customer in the one-train-a-day town is called on oftener because the business car makes it unnecessary to de-

### Business Car Mounted on a Truck Chassis

*THE White Co. has placed on the market a new type of car known as the White Business Car. This model is a development of the taxicab chassis and is especially designed for salesmen.*

*The rear compartment may be fitted to accommodate whatever business equipment the user may have to carry.*

vote a whole day to a single call. Between-train losses of time are eliminated.

The body has ample room for two large persons. A permanent non-folding top gives protection against the

weather and there is ample room for baggage back of the seat.

Space for two suitcases is provided in a compartment back of the seat and accessible from the seat. In the rear deck, accessible through a door of full width, is a compartment designed to enclose whatever material is carried. The compartment contains three drawers, each 3½ in. deep, measuring as follows: One, 54 by 30 in.; one, 57 by 30 in.; and one, 60 by 20 in.

Standard equipment includes starting and lighting, extra rim, tire carrier on left running board, tire pump and tire repair outfit, license brackets, jack and full set of tools. The seat is trimmed in black, hand-buffed leather in French plaits. The cushions are built up with coil springs and No. 1 gray hair. The door is trimmed with plain black hand-buffed leather. Pantasote curtains with celluloid windows are used. Door curtains are fitted and ironed to open with door.

The car has a 119-in. wheelbase. Other specifications included a pressed steel frame; 3¼ by 5½-in. four-cylinder engine, cast in block with the valves at the



View of new White Business Car chassis



## Buyer's Department of The Commercial Vehicle

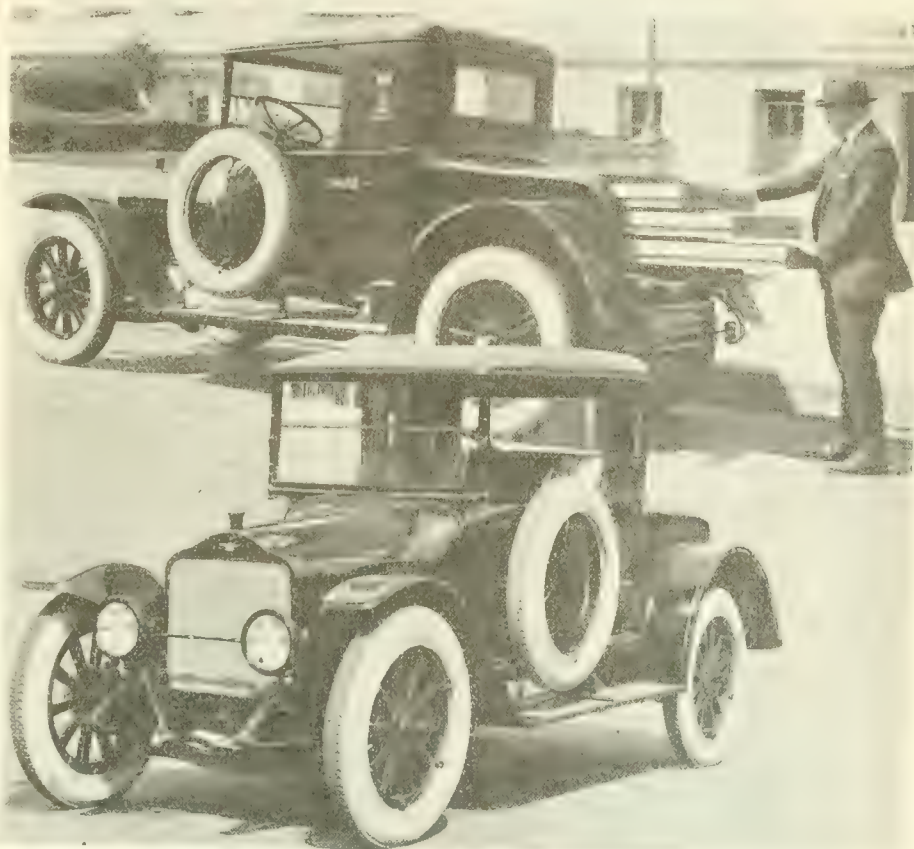
right; automatic spark control, vacuum feed, and a direct bevel type of rear axle.

Water is circulated by a centrifugal pump through a cellular type of radiator. Engine lubrication is taken care of by splash and pressure. The three-speed selective gearset is placed amidships. Propulsion is taken through radius rods while driving torque is taken through the springs. The car is equipped with half-elliptic and three-quarter elliptic springs at the front and rear, respectively. Both the hand and service brakes are mounted on rear wheel drums, the former being of the internal-expanding type while the latter is external.

While this business car has the appearance of a passenger model it is of truck construction, combining the rugged qualities of a truck with the comfort and trim appearance of a passenger car.

In addition to being adaptable to salesmen's work, this car is especially designed for foremen and superintendents of utility companies who are doing extension work in several localities at one time; of mining, oil and logging companies whose men must get about in rough country in all weather; of cattlemen with extensive ranches; of road contractors, inspectors and insurance men; of sugar and cotton growers with scattered plantations.

The Coca-Cola company was one of the first to purchase the White Business Car, having purchased twenty-six for use of its salesmen in various parts of the country.



*White Business Car with drawers in rear compartment*

## New Worm-Driven Maccar of 2-Ton Capacity

### MACCAR SPECIFICATIONS

Capacity, tons.....	2
Price.....	\$3,100
Wheelbase, in.....	150*
Tires, front.....	36 x 4
Tires, rear.....	36 x 4
Bore, in.....	4 1/8
Stroke, in.....	5 1/4
N. A. C. C. hp.....	27.2
Gear ratio in high gear.....	8.5
Final drive.....	Worm

\* or 162 in.

The clutch and four-speed gearset are both of Brown-Lipe design. Spicer universal joints are used. The rear axle is of Timken design. Merrill springs are used both front and rear.

The steering gear, which is of Ross design, is mounted on the left, control being in the center. Spark and throttle control are on top of the steering wheel.

A foot accelerator is also supplied.

The frame is of pressed alloy steel, heat-treated, 6-3/16 in. deep with 2 1/2-in. flanges, 1/4-in. thick. Steel wheels are used and are mounted with dual solids on rear. The chassis weight is 5,200 lbs. Equipment includes side and rear oil lamps, tool box, horn, jack and complete set of tools.

THE new 2-ton worm-driven Maccar, Model H-A, gives the Maccar Truck Co. a capacity range of five different sizes. These now include 1 1/2, 2, 3, 4 and 5-ton chassis.

The latest model uses a Continental engine which is a unit with the gearset. Fuel is fed to the Zenith carburetor by gravity. Engine speed is governed by a Mueller governor. Ignition is taken care of by an Eisemann high-tension magneto. Lubrication is by force feed. Water is circulated by a centrifugal pump through a fin and tube type of radiator of Maccar design.



*Chassis view of new 2-ton worm-driven Maccar, model H-A*



# Buyer's Department of The Commercial Vehicle

## Belflex Fabric Spring Shackle

THIS shackle has the following features: Requires no lubrication; acts to snub the spring when so desired; cannot squeak or rattle; requires no attention or adjustments for wear; and is claimed to save spring breakages due to rebounds and to increase the life of the spring by delaying the fatigue in the spring metal. The makers also claim that it cushions the vehicle from minor road shocks, there being no metallic contact between the frame and axles.

The tension type of Belflex spring shackle, as used on semi-elliptic springs, is made by clamping together four or more strips of rubberized fabric into a link or shackle which is bolted fast to the spring at one end and to the frame bracket at the other end. The clamping faces of the top and bottom boxes protrude at an angle in such a manner that, under rebound, the fabric strips act as a cushion between them. The difference in the angles of faces of the two covers is necessary because the lower cover is at all times rigid, being held fast to the rigid frame bracket, while the other, the upper one, moves with the spring. These faces of the covers are called the rebound faces. The maker is the Belflex Corp., New York City.

## Columbian Power Hoist

THE new Columbian power hoist will soon be in production. Its action is direct and positive. The power of the motor is transmitted direct from the transmission take-off or propeller shaft to lifting cables through a clutch controlled bronze worm and bull gear. A two-way combination disk and cone clutch operating on the worm shaft controls elevation and descent and when thrown in neutral holds the body at any stage of elevation. The motive power is pre-engaged and disengaged by a simple primary clutch at point of power take-off, be it transmission or propeller shaft.

The frame is of pressed steel in which is contained lifting cables, cable drum and bull gear. The bronze worm gearing runs in oil and is contained in oil-tight, dirtproof cast iron housing.

The body may be mounted within a foot of the rear of the cab. The weight complete is 400 lbs. The maker is the Columbian Steel Tank Co., Kansas City, Mo.

## Bosch Battery Ignition for Fords

THIS equipment consists of distributor, coil, engine front plate, cables and fittings necessary for installation. The engine front plate is designed to take the distributor and breaker mechanism and replace the standard plate.

## Truck Accessories

An automatic regulator is provided which controls the spark. A complete bulletin describing the installation of this ignition system has been issued by the American Bosch Magneto Corp., Springfield, Mass. The price of the ignition is \$26.

## Monarch Governor Model G

THIS new suction governor has only two moving parts. The conoid or governing member, shown in the accompanying illustration, in conjunction with cone controls the governor action. Held normally in a wide open position by the spring, the conoid is acted upon by the velocity of the explosive charge passing from the carbureter to the engine. The increase of velocity overcomes the resistance of the spring and causes the conoid to rise in the tapered cone, closing the butterfly, to which it is connected. Thus the speed of the engine is controlled. The rocker arm is provided at either end with a hardened ball point bearing that oscillates in a hardened steel cup. The maker is the Monarch Governor Co., Detroit.

## Perfection Disk Wheel

THIS wheel is resilient, can be quickly mounted on the wood wheel hub and is demountable for quick tire changes. The valve stem extends through the outside, facilitating inflation of tires. Ford wheels are shipped ready for installation without machine work or fitting. The wheels come in sets of five, ranging in price from \$42.50 to \$62.50. The maker is the Perfection Motor Parts, Detroit.

## Speed Guv-N-R

THIS is controlled by the clutch pedal. By pushing the pedal in low, the throttle shutter in the governor automatically opens, allowing free passage of gas. Releasing the pedal automatically restricts the flow of gas to a predetermined amount at which the governor has been set. This governor is placed between the carbureter and the intake manifold. The maker is the Speed Guv-N-R Co., Chicago.

## One-Minute Repair for Ford Radiators

CONSTANT pounding on the Ford cross member causes it to sag or break. When the cross member sags the radiator must hold the side rails together, thus the weight of the car is pulling across the radiator, causing the

ears of the radiator to break off or the radiator to split and spring a leak. The One-Minute Repair pulls the side members together, relieving the radiator of all strain.

## Noose Anti-Skid Chain

THIS chain has only one connection and that is where the strain is very light. The pull is on the slip knot of the chain while the center chain acts merely as a retainer or adjusting chain. It is adjustable and also reversible and will take a large range of wheel sizes due to this fact. Another feature is the fact that it cannot come off in service. When worn through, the maker claims that the chain cannot fall on the chain of a chain-driven truck or catch in the brake lever, as it is always pulled to the outside of the wheel. The maker is the Noose Chain Corp., New York City.

## Splitdorf Air Spring

COMPRESSED air is used in this device to absorb the shock. It is installed in place of the spring shackle. A hollow cord rubber ball, which is inflated just like a tire to a pressure not exceeding 20 lbs., supplies the resiliency required for the purpose. The installation is simple and it is not necessary to drill holes or provide additional material. These absorbers are manufactured for all makes of trucks. The manufacturer is the Splitdorf Electrical Co., 98 Warren Street, Newark, N. J.

## Neverout Hand Warmers

THE hand warmers slide over the inner side of the steering wheel easily and are clamped in place with a screw driver. The current consumption is 3 amps. per hr. on a 6-volt circuit. The maker is the Rose Mfg. Co., Philadelphia.

## B. G. Spark Plug

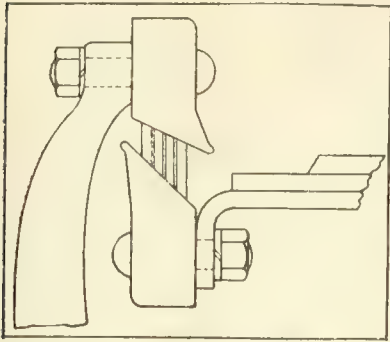
THE feature of this plug is a small monel metal disk. This disk heats instantaneously and remains hot and is said to act as a hot-spot. The electrodes are nickel manganese and the insulator is guaranteed not to crack from heat. The shells and coupling nuts are made from low carbon steel. The manufacturer is the B. G. Corp., 33 Gold Street, New York City.

## Losee Cutout

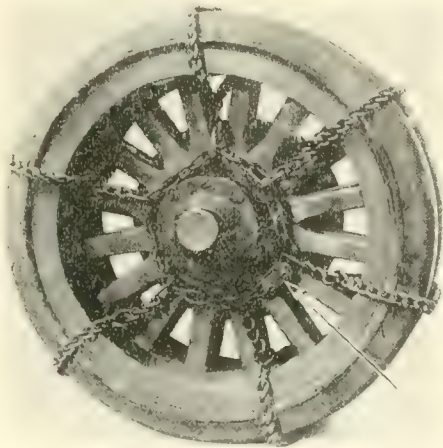
THIS is made in the following sizes, 1½, 1¾, 2, 2¼, 2½, 2¾, and 3 in. The lever for opening and closing the cutout is located on the cowl within reach of the operator. The damper valve is made from ½ in. steel and is accurately fitted. Prices range from \$9 to \$11, depending on size. The maker is the Losee Motor Products Co., Hebron, Ill.



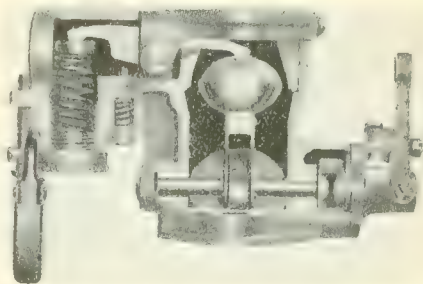
Buyer's Department of The Commercial Vehicle



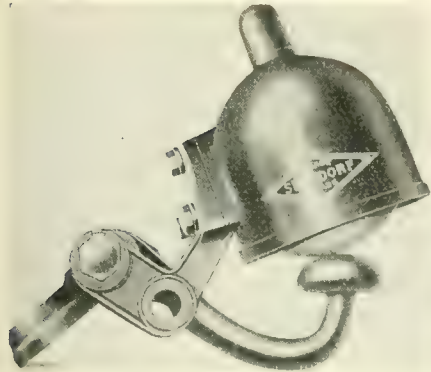
Belflex spring shackle



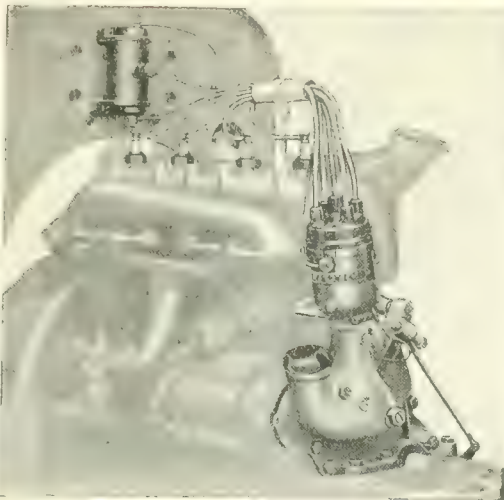
Noose anti-skid chain



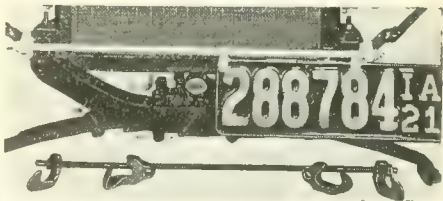
Monarch governor



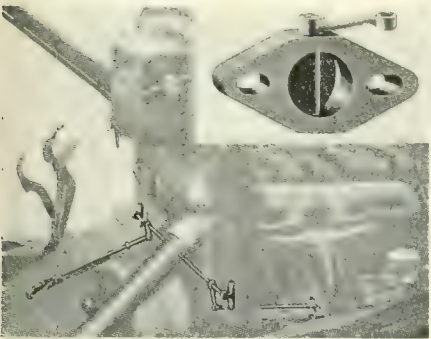
Splittdorf air spring



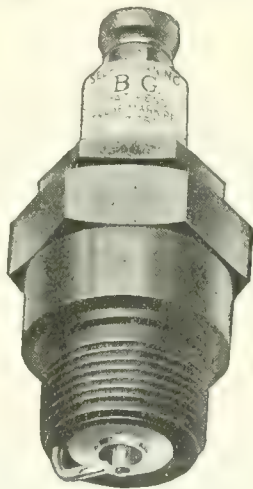
Bosch ignition for Fords



One-Minute repair for Ford radiators



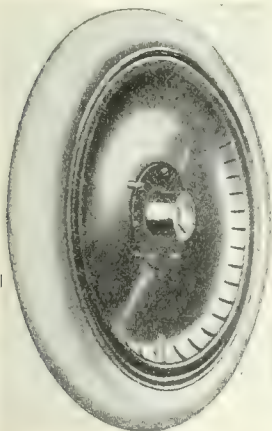
Speed Guv-N-R



B. G. spark plug



Neverout hand warmers



Perfection disk wheel



Columbia hoist



Losee cutout

## Buyer's Department of The Commercial Vehicle

### Boe Grease Bucket Pump

THE Boe pump can be used to pump old grease out of gearcases and new grease into them. It has adjustable measuring means graduated to ½ lb. or ½ pt. The entire pump is interchangeable from one bucket to another. The price of the 30-lb. capacity bucket is \$12.50. Extra buckets cost \$2.25. The maker is the Boe Mfg. Co., Minneapolis, Minn.

### Imperial Engine Cleaner

THIS cleaner operates on the injector principle and throws a powerful spray of kerosene onto the parts to be cleaned. The flow of kerosene can be regulated by turning the knurled ring where the spout joins the body of the cleaner. After the surface has been cleaned, the kerosene may be shut off entirely and the parts dried with the air jet. It is furnished equipped with a yoke and thumbscrew for attachment to tire air chucks and also with an extra hose nipple. The maker is the Imperial Brass Mfg. Co., 1200 West Harrison Street, Chicago.

### Presto Rim Tool

A SPECIAL tool for opening and closing demountable rims. It is designed so that the rocker grips tighten as soon as a force is applied to the handle in either direction. It is claimed that it can be attached or detached from a rim in 10 sec. The model manufactured for the service stations has the corrugations on the rockers hardened to prevent wear. The tool is also adapted for use on the Kelsey type of rim. When the tool is folded, it makes a package 2½ by 7 by 8 in. The price is \$4.50. With hardened rockers the price is \$6. The manufacturer is the Shelby Tool Co., Shelby, Mich.

### Halee Crankpin Tool

THE Halee crankpin tool can be used to true worn or out of round crankpins without dismantling the engine. The cutting blade is always automatically on the crankpin center on small or large bearings. Four blades of different lengths are furnished. The 1 to 2-in. sizes cost \$35, the 2 to 3-in. sizes, \$40. The maker is the H. A. Lee Tool & Mfg. Co., 310 West 20th Street, Kansas City, Mo.

### Masco Combination Wrench

THE feature of this wrench is the end forming an angle, making it easier to operate in inaccessible places. The other end is the usual straight jaw wrench. This wrench has an instantly adjustable arrangement in the two slots

### Shop Equipment for Fleet Owners

running through the threads. The jaws may be set to any width when sliding in these slots, and a slight turn engages the threads and holds the jaws tight. The price of the 8-in. size is \$1.50. The 10-in. size costs \$1.75. The maker is the Auto Specialty Co., Buffalo, N. Y.

### Brandford Sprayer and Cleaner

THIS is coupled direct to any compressed air hose and operated with any pressure above 20 lbs. It is made of malleable iron. Saving of time in cleaning engines, radiators, etc., as well as in putting a priming coat of paint on the truck makes this device a handy one around the truck garage. The price is \$4, f.o.b. factory. The maker is the Malleable Iron Fittings Co., Brandford, Conn.

### Sims Oil Filter

THIS is a mechanical filter for removing solid foreign matter from lubricating oil. It is made in six sizes which range in capacity from 2 to 3 gallons per day up to 30 to 50 gallons per day. The price ranges from \$20 to \$100. The manufacturer is the Sim Co., Erie, Pa.

### Emka Buzzer Tester for Trouble Shooting

THE tester has a telephone-receiver used for testing resistance of insulation. The combination consists of a buzzer, telephone connection and flashlight battery, or of buzzer alone, small incandescent lamp, telephone connections and flashlight battery. The weight is 17 ounces. A double cord is used for testing for ground, bad contacts or broken wires. Prices vary from \$6 to \$11, according to equipment. The maker is the Electric Signal Mfg. Co., 31 Tremont Avenue, Orange, N. J.

### Elmeo Junior Test Set

THE complete set consists of a magnetic chuck or growler, a small instrument panel carrying a voltmeter, ammeter, test lamp, etc., and a G. E. ¼ hp. type SA, A. C. motor, all mounted on an aluminum base. Test can be made for charging rate, bringing field up to standard, motoring tests, cutout tests, grounded or short-circuited armatures or field coils, grounded commutator segments, open coils, etc. The maker is the Electric Machine Corp., Indianapolis.

### Manley Universal Engine Stand

This new stand is portable and is designed to handle any engine or axle during the repair period. The swivel castors are mounted on roller bearings and may be quickly removed to make the stand stationary. A locking device may also be used to make stand stationary without removing castors. A feature of the stand is the ease in turning over the heaviest engines. This is made possible by the use of spur gears. A 6 to 1 ratio necessitates only six turns on the double crank to swing the engine in a complete circle. Sliding brackets are used instead of holes in the side rails for engine suspension. The stand is equipped with a steel tool and parts tray which swings to any location around the engine. The maker is the Manley Mfg. Co., York, Pa.

### B & D ¼-In. Drill and Grinder

A NEW light weight ¼ in. portable electric drill, designed for drilling in metal or wood, has been placed on the market by the Black & Decker Mfg. Co., Baltimore, Md. This model may also be used as a grinder, the company being prepared to supply a base which can be readily mounted in order to handle the clamp washers and grinding wheel. This attachment costs \$2 extra. This means that the base can be screwed to the work bench and when it is desired to use this drill as a bench grinder the drill can be attached to the base and an emery wheel attached.

The drill has an aluminum alloy housing and weighs only 5 lbs. It has double reduction gearing, giving a no-load speed of 1600 r.p.m. This drill resembles in all respects the rest of the B & D line. The price with a three jaw chuck, flexible cord and attachment cord is \$39 east of Denver, Colo., \$39.50 west.

### Excel Jack

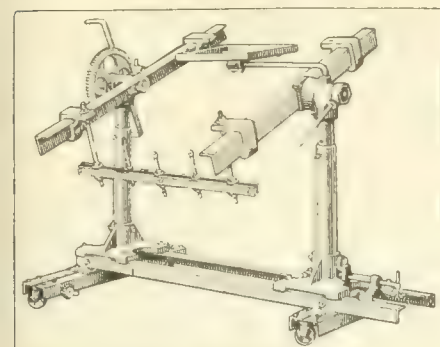
THE jack is a caster jack for garage use, is quick acting, capable of doing heavy work and can be adjusted immediately to any part of the frame or chassis. The long handle enables it to be pushed under the vehicle. The capacity is 2000 to 3000 lbs.; leverage of handle, 60 in.; weight, 48 lbs.; lowest lift, 10½ in.; highest lift, 24½ in. A toe extension has a lowest lift of 4½ in. and a highest of 15 in. The price is \$30. The maker is the Randall-Faichney Co., Boston.

### Freeze-Not

THIS is a liquid, anti-freezing solution retailing at \$1.25 per gallon or 65 cents per gallon in barrel lots with a charge of \$5 for the steel container. The maker is the Gleason Chemical Co., Davenport, Iowa.



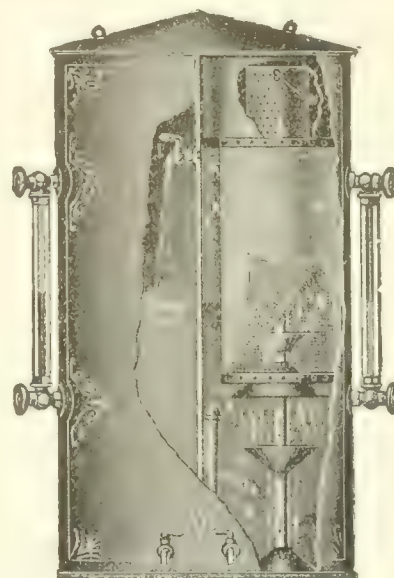
# Buyer's Department of The Commercial Vehicle



*Manley engine stand*



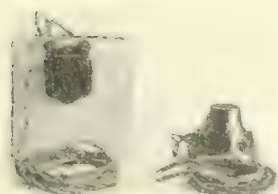
*Imperial cleaner*



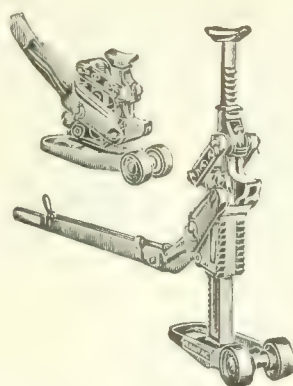
*Sims oil filter*



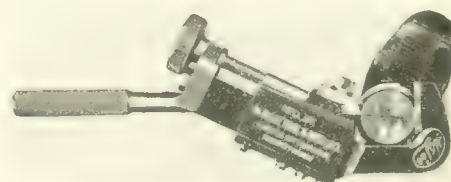
*Brandford sprayer*



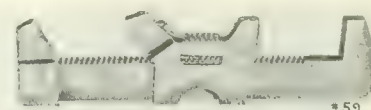
*Emka trouble shooter*



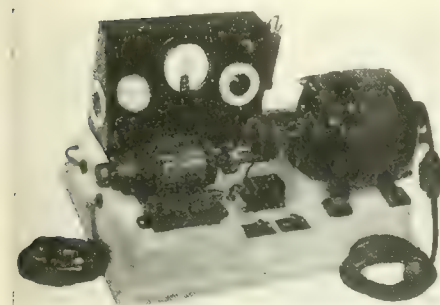
*Excel jack*



*Halee crankpin tool*



*Masco combination wrench*



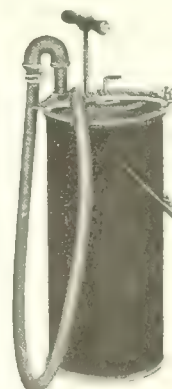
*Elmco test set*



*B & D drill and grinder*



*Presto rim tool*



*Boe grease bucket pump*

# The Truck with the Giant Arm

*Universal Crane, Mounted on Different Trucks,  
Speeds Up All Types of Loading and Gives  
Greater Flexibility in Maneuvering Into Position*

AT a time when executives are figuring on the reduction of every possible item in the cost of production, much thought is being given to handling the transportation of materials. In the new order of things it is going to be necessary for trucks and incidental equipment to be loaded faster than ever before, and a great many jobs previously done by hand labor will now have to be done by machinery.

A fast portable locomotive type of crane has been placed on the market by the Universal Crane Co., Cleveland, that has been designed to fit in with the demand for speedy loading and unloading.

In addition to speed of operation, this machine was also designed for durability of construction so that it will stand up under the hardest kind of crane work. At the same time it has been built sufficiently light to be mounted on a 5-ton motor truck, its total weight being approximately the same as a 5-ton payload plus a 1-ton body load.

This feature permits firms handling a number of jobs at widely separated points to attain a high degree of speed between jobs often doing away with the necessity of having a large labor gang at a job which would only be effective at peak times, and reducing the amount of waste time usually taken in getting equipment between jobs.

The Universal crane can be applied to a large number of 5-ton trucks because of its light weight and its compact construction. It has a rear swinging clearance of only 7 ft. 6 in. from center of rotation. The application to different types of trucks has required certain special details for bolting the crane to the truck frame and properly distributing the loads with the thought in mind of preventing the tipping of the truck frame due to the play of springs when the crane is operating.

## Preventing Tipping

These details consist ordinarily of a jack screw mounted on each side of the crane base which can be screwed down by hand to rest on the truck spring over or very close to the rear axle. These jacks prevent the downward deflection of the truck frame on the truck springs and they can be easily released by hand.

To prevent an upthrow of the springs by tipping of the crane, stirrups are placed on each side of the truck with the upper end connected with the crane frame and extending under the rear axle with sufficient play to allow the truck to travel over a road without adjustment of the stirrups.

Springs or rubber cushions are usually used in the bottom of these stirrups

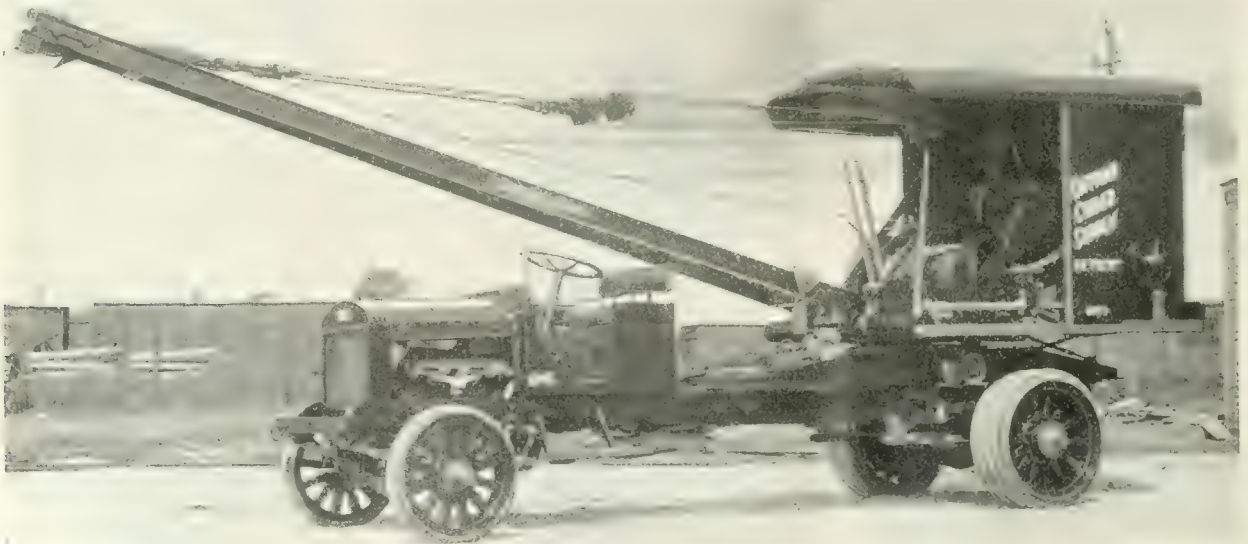
to take up shocks during travel. When a two-line bucket is used on the crane, a bumper frame is placed on the front of the truck to which the bucket is tied during travel.

This crane is built as a standard unit to mount on any one of a number of mountings, such as a motor truck, rubber tired trailer, railroad flat car, industrial truck, continuous tread, and others, and can be easily transferred from one to the other by its own power if necessary.

The machine is equipped to operate a clam shell bucket, lift loads with a hoist block or handle an electric lifting magnet. A generator for exciting the magnet can be furnished if necessary. Other special equipment such as a drag line, pile drive, post hole digger, capstan head and others can be furnished for special work.

Speeds of operation with this crane are exceptionally fast, as demonstrated recently on a Mack truck. Three hundred and thirty tons of coal were at that time unloaded in a 9-hr. day and placed in trucks which hauled it away. In addition, one of these cranes has unloaded a 38-yd. car of sand in 27 min. and averaged 33 min. a piece on a number of others.

With an ordinary skilled operator, the crane can make about three trips a min-



*Side view of the Universal crane which has been designed to fit in with the demand for speedy loading and unloading of trucks. Being portable, it lends itself to nearly all heavy loading conditions*



ute. This is of course contingent upon operating conditions with a grab bucket and possibly more with a magnet. As an illustration of speed in unloading cars of machine cast pig iron with a 36-in. lifting magnet, one of these cranes has unloaded a 50-ton car and placed the pig iron in wagons in 2¼ hrs. or unloaded a 50-ton car to ground storage in 1¼ hr.

Portability of this crane may be best illustrated by a trip made by a truck from Cleveland to Atlantic City and thence to New York City on which the unit was hauled 22 hrs. a day at an average speed of 10 to 12 m.p.h. A large street railway has been using one of these cranes for some time mounted on a motor truck which spends about half of its time traveling between jobs.

The crane is composed of a driving motor, two drum hoisting mechanism, power boom hoist, power rotating gear, power traveling mechanism and all necessary levers and operating gears to control the various crane functions.

### Driven by Engine

The crane shafts are coupled up with the driving motor through a train of reducing gears to rotate at very slow speeds. Under operating conditions the motor and crane shafts run continually and the various crane movements are controlled through the clutches and brakes.

The complete unit is operated by its own gasoline or electric motor. It has all of the functions of the larger type of locomotive cranes. The levers are conveniently placed so full view of all crane operations can be had.

The capacity ranges from 3 to 4 tons, depending on counterweight furnished, length of boom used, mounting and the radius at which crane is working.

The crane has full circle swing and high speeds throughout for travel, hoisting and rotating. A travel mechanism for moderate speed can be furnished when the crane is mounted on a conveyance which has no other means of propulsion.

A heavy duty four-cylinder low-speed engine is used. The powerplant is equipped with a governor for proper control of engine under load.

The boom, which may be varied in length to suit conditions, is built of structural steel.

### Equipment

Various equipment can be furnished to suit conditions, such as a ½- or ¾-yd. grab bucket, electric magnet, hoist block, single, double or separately driven drums, cab, niggerheads, capstan, steam shovel attachment, and post hole digging attachment.

A full set of special standard tools is furnished with the machine. The net shipping and operating weight of the crane is approximately 13,000 lb. When it is mounted on a rubber tired trailer the power or hand steering gear can be included. The steel wheel yard truck and continuous tread type have the power steering gear.

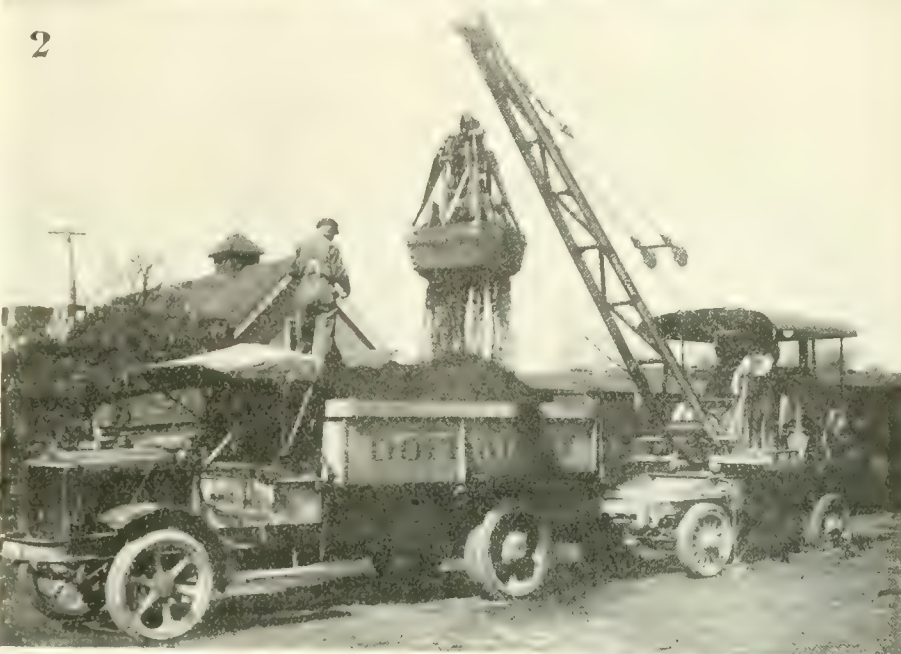


Fig. 1—In road and construction work, the Universal crane, equipped with a clamshell bucket, proves a source of time and labor saving. Fig. 2—View showing the adaptability of this crane in a coal yard. Fig. 3—Much time can be saved in the handling of timber during the loading and unloading periods. Once the timber is properly arranged, it is but a matter of seconds before it is placed on the truck or trailer. The same applies during the period of unloading. The net shipment and operating weight of the crane is approximately 13,000 lbs.







## Tire Cost Keeping and Interest—Another Point of View

To the Editor, COMMERCIAL VEHICLE:

We appreciate the difficulties which confront the man who endeavors to determine a satisfactory basis for an accurate determination of truck costs. Your suggestion that tire mileage be based on previous experience is an excellent one, although of course, as you intimate, it does not apply to the man who is installing this system coincident with his first attempt to operate trucks. However, is not the situation analogous with that of the truck itself in which no guarantee of mileage is taken into consideration, although there is as great a variation of useful life as there is in tire service. The operator does not know whether his trucks will deliver 100,000 or 200,000 miles before they are ready for the junk heap.

I am very much interested in your suggestions regarding interest. I agree with you as to the method of proportioning this throughout the 5 or more years of supposed truck life, taking into consideration the added depreciation which is written off yearly. However, I cannot quite feel that interest should be charged only in the case of those operators who borrow money and should be eliminated as an item if they furnish their own capital either from a savings bank or other resources.

Money that is invested costs a certain rate of interest whether the owner must pay that interest or whether he loses it through inability to invest in some other securities. If I have \$10,000 stored away in a stocking, that money is costing me the return which I might obtain from a safe investment. If I borrow money to install a fleet of trucks, I will probably pay 6 per cent to my bank. If I have that money on hand in the form of readily liquidated 6 per cent mortgages, I will be losing that 6 per cent income and should therefore charge the truck investment the prevailing rate of interest whether I furnish my own capital from liquidation of securities or borrow it.—H. W. SLAUSON, Engineering Service Manager, Kelly-Springfield Tire Co., New York City.

## Newly Rebuilt Engine Knocks When Running Idle

To the Editor, COMMERCIAL VEHICLE:  
My engine knocks when running idle a little speed or on the road over 10 p.h. It sounds like a loose connect-

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

ing rod, but when the throttle is closed entirely the knock disappears at once, even if the truck is going fast. If the throttle is opened just a few notches, the knock is right there again. We have looked over the connecting rods several times, but they do not seem loose. The engine has been rebored, new pistons fitted, new push rods, valves, front camshaft bearing, new timing gears, and endplay taken out of the crankshaft. The gearset was not touched.—K. MACKSEY, Passaic, N. J.

To our knowledge one of the connecting rods was not in alignment at the

## Questions

This Forum Department is a regular feature of each issue of THE COMMERCIAL VEHICLE. It is an open forum for the discussion of motor truck problems by our readers.

## Make Use of It

time the engine was assembled. This has caused undue wear in one of the pistons, which is now slapping; or it is possible that the piston may have fitted itself to the cylinder and is not slapping, but that the sprung rod is knocking on the boss. We recommend that the pistons be removed and disassembled and that the crankpin and wristpin ends of the rods be carefully checked for alignment. This should be done on an alignment jig.

## Removing Rust and Paint from Radiator Before Soldering

To the Editor, COMMERCIAL VEHICLE:  
Can you give any advice on a solution to use or any method to employ to remove the rust and paint from a truck tubular radiator which will leave the metal clean enough to take solder by dipping?—A. H. DUFFEE, Fairhaven, Mass.

Oakite, a solution manufactured by the Oakley Chemical Co., 22 Thames Street, New York City, will take care of this work for you.

## States That Have Laws Covering Use of Mirrors

To the Editor, COMMERCIAL VEHICLE:

Please give a list of states that have laws covering the use of mirrors on motor trucks.—READER.

The following states, to our knowledge, require the use of mirrors:

California	Use if rear view is obstructed. (1920)
Colorado	Rear view mirrors. (1921)
Connecticut	Use if rear view is obstructed. (1920)
Delaware	Rear view mirrors. (Passed House and Senate. Awaits Governor's approval).
Idaho	Rear view mirrors. (1921)
Indiana	Rear view mirrors or reflector. (1921)
Maryland	Use if rear view is obstructed. (1920)
Massachusetts	Use if rear view is obstructed. (1920)
Michigan	Use on trucks of 1½-ton capacity or more. (1921)
New Jersey	Use unless rear view is clear. (1920)
New York	Mirrors on 1-tonners or more outside cities of first and second class. (1920)
Oregon	Rear view mirrors. (1921)
Pennsylvania	Use if view is obstructed. (1920)
Vermont	Mirrors of at least 6 in. diameter. (1920)
Washington	Use where view is obstructed. (1921)

## Figuring Cubic Displacement of an Engine

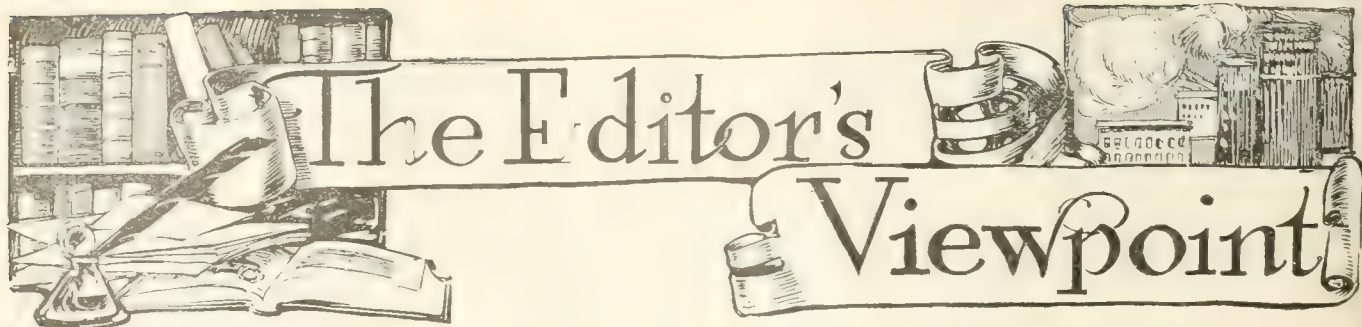
To the Editor, COMMERCIAL VEHICLE:

I would like to know whether it is possible to use the throw of the crankshaft in measuring the cubic displacement of an engine. I would also like to know how to figure the cubic inch displacement of a four-cylinder engine.—C. R. SPAHR, Chambersburg, Pa.

It is possible to use the throw of the crankshaft in measuring the cubic displacement of an engine. As you may know the throw of the crankshaft is just one-half the stroke of the piston. The usual way, however, to measure the cubic displacement of an engine is by the following formula:

Square the radius or one-half the bore; multiply this by 3.1416; multiply by stroke of piston; and then multiply by number of cylinders.





## Do You Buy Time?

**T**IME is money in practically every industry. Trucks play a part both as feeders and as distributors in most industries.

Getting what you want is essential in most cases in every industry. Getting it when you want it is equally essential in most industries. And trucks are playing a big part and are capable and ready to play a much bigger part in getting goods to the manufacturer, to the distributor and to the consumer—*when he wants it.*

In the automotive industry to-day figures have been compiled showing the comparative costs of transportation by rail and by truck and the comparative time consumed by each method of transportation. Some of these figures were reproduced in the editorial in the Oct. 15 issue of this magazine.

To New York from	Miles	100 lb. cost by rail	100 lb. truck rate	Hours saved by truck
New Rochelle	17	\$1.03	\$0.25	21
Stamford, Conn.	34	1.10	0.60	19½
Bridgeport, Conn.	57	1.20	0.75	41
New Haven, Conn.	74	1.23	0.80	39½
Hartford, Conn.	109	1.28	1.10	108
New London, Conn.	127	1.36	1.30	106
Springfield, Mass.	150	1.28	1.50	152
Providence, R. I.	185	1.41	1.90	76
Gloucester, Mass.	201	1.54	2.00	147
Fall River, Mass.	220	1.41	2.20	97
Boston, Mass.	233	1.41	2.40	71
Lowell, Mass.	259	1.46	2.60	141

In the shorter hauls mentioned in this list—the hauls up to 150 miles in length—not only is haulage by truck considerably cheaper than it is by rail, but haulage by truck means a great saving in time in each case. This saving in time varies from 19½ hours up to 108 hours. By each of these very appreciable savings in time does the consignee obtain the goods he wants more nearly when he wants them. That is, haulage by truck not only saves him money in the actual costs of the transportation, but saves him money in time also, for time is money.

In connection with this estimate of costs and time by truck and by rail it must be remembered, also, that the rail costs are estimated to include the cost of haulage at either end of the railway run on a normal basis. But if trucks are not available or terminals are congested at either end of the railway run, not only will the cost of transportation by rail be increased, but the time taken at either end

for transfer from the truck to the car and from the car to the truck again may also be increased, for it is subject to many occasional delays.

Then there is the question of the longer runs. These figures have only been estimated up to about 250 miles, for it seems generally agreed, and with some reason, that transportation by truck above 250 miles in length is less economical than by railroad, except in rare cases of great need.

But the longer runs, from 150 miles up to and including runs of 250 miles, are economical by truck. Transportation by truck costs more, over these greater distances, than by railroad. It costs more in actual cash outlay at the time. But it does not cost more in the final analysis, because time is money and transportation by truck over these distances saves anywhere from 71 hours to 152 hours of supremely valuable time.

Take the case in the above table in which transportation by truck appears to least advantage—that of the run from New York to Lowell, Mass. This run costs \$1.46 per 100 lb. by rail and \$2.60 per 100 lb. by truck. A 5-ton truck carries a load of 10,000 lb. This load would cost \$260 by truck. By rail it would cost \$146. Thus shipping by truck means an additional cost of \$114.

But shipping this 5-ton load by truck instead of by rail means a saving in time of 141 hours. This means that the shipper is paying about 80 cents for each hour he saves on the *entire load*, or less than a cent for each hour he saves on each 100 lb. shipped.

Is there an industry in which possible spoilage, the delay in production and the idleness of costly men and machinery, or the necessity of fulfilling a contract will not make this payment of 80 cents per hour saved on the entire load worth while?

This cost of 80 cents per hour saved is based on the *worst* case mentioned in the table above. The cost per hour saved is very much less in most instances.

Therefore, is not short-haul transportation by truck very much worth while, even where it does cost more than hauling by freight?

Are the commercial truck haulers of the country bringing this side of their argument home to shippers and consignees as it should be brought home?



## Wants Government to Help Highway Lines

### Under Aims of Senate Bill Government Would Buy Highway Motor Stock

WASHINGTON, Oct. 27.—Senator Sheppard, Democrat, of Texas, has introduced a bill to encourage highway motor transportation in this country by authorizing the Government to subscribe for stock in organizations created for the purpose and for establishment of a national highway motor transportation bureau. The bill provides that the sum of \$100,000 be appropriated to enable the proposed motor transportation board to secure such expert assistance as it may deem advisable in carrying out the purpose of the proposed act. Another appropriation of \$7,200,000 would be authorized for the purchase of stock in corporations and would be issued by the Secretary of the Treasury to the corporations specified by the trade.

The bill, which is known as S. 2631, further provides that it shall be shown to the satisfaction of the board (a) "that a corporation is in process of organization within a State, Territory, or the District of Columbia, by reputable and reliable persons for the purpose of operating a highway motor transportation route at least 50 miles in length, (b) that the plans, resources, capital stock, rates, personnel, material, and probable business of such corporations are, or will be, of such nature or amount as to offer reasonable hope of success, (c) that the laws of the State, Territory or District in which the route is to be operated provide proper protection for the permanent operation of the corporation and proper construction and maintenance of the highway or highways to be utilized by the corporation, the board for and in the name of the Government of the United States shall subscribe the last fourth of the capital stock of the corporation remaining unsubscribed."

The proviso is inserted that application for such subscription shall have first been made in writing by the stockholders of the corporation over verified signatures. The rate of interest is fixed at 10 per cent and the amount paid by the Government will constitute a loan from the Government to the corporation, repayable with interest at the rate of 5 per cent per annum in ten annual installments, the first installment to be due 5 years after date of subscription, repayment of total amount advanced including interest to be guaranteed by a bond satisfactory to the board. The issuance of stock is limited to six corporations within one State, Territory or District of Columbia. Under the Sheppard bill corporations would be obliged to make annual reports covering transactions and progress during the preceding year. There is a provision in the bill which prohibits the purchase of other stock unless subsequently authorized or directed by Congress. This bill has been referred to the Committee on Interstate Commerce and Senator Sheppard insists that he will press for an early hearing but it is doubtful whether it will pass at this session.

### Price Reductions

ALMA, MICH., Nov. 2.—Prices of Republic trucks have been reduced effective immediately as follows:

### Connecticut Truckmen Organize to Secure Fair Legislation

BRIDGEPORT, CONN., Nov. 1.—Motor truck owners have organized the Motor Truck Assn. of Connecticut to fight unfair truck legislation. Fifty cities in this state are represented in its membership. Attorney General J. H. Light of Norwalk has been appointed counsel for the organization. An appeal has been made to Governor E. J. Lake to call a special session of the legislature for the repeal of the carrying-capacity law.

	Old Price	New Price
1 ton.....	\$1,695	\$1,395
1½ to 2 ton.....	2,295	1,795
2½ to 3 ton.....	2,795	2,195
3½ to 4 ton.....	3,845	3,095

MINNEAPOLIS, Nov. 2.—The Wilcox Trux, Inc., has made reduction in price on all its models as follows:

	Old Price	New Price
1 ton.....	\$2,100	\$1,900
1½ ton.....	2,775	2,550
2½ ton.....	3,300	3,000
3½ ton.....	4,250	3,950
5 ton.....	5,200	4,350

DETROIT, Nov. 9.—The Standard Motor Truck Co. has reduced the price on its entire line:

	Old Price	New Price
1½ ton.....	\$1,800	\$1,600
2½ ton.....	2,800	2,400
3½ ton.....	3,600	3,200
5 ton.....	5,250	4,400

NEWARK, Nov. 4.—Day-Elder Motors Corp. announces reductions ranging as high as \$500 in the prices of its truck models. The list follows:

	Old Price	New Price
1 ton.....	\$2,100	\$1,600
1½ ton.....	2,300	2,000
2 ton.....	2,750	2,400
2½ ton.....	3,025	2,750
3½ ton.....	3,750	3,150
5 ton.....	4,250	4,250

SCRANTON, PA., Nov. 7.—Price reductions have been made in several models of trucks manufactured by the Maccar Truck Co. The list follows:

	Old Price	New Price
1½ ton.....	\$2,925	\$2,700
2 ton.....	3,300	3,100
3 ton.....	3,650	3,400
4 ton.....	4,500	4,200
5-6 ton.....	5,500	4,950

FLUSHING, L. I., Nov. 1.—The Rainier Motor Corp. announces the following price revision on its trucks:

	Old Price	New Price
¾ ton.....	\$2,150	\$1,990
1 ton.....	2,350	2,150
1½ ton.....	2,600	2,490
2 ton.....	2,950	2,890
2½ ton.....	2,600	2,550
3½ ton.....	4,500	4,000
5 ton.....	5,250	5,100

## President Signs Road Construction Bill

### Road Building Will Start Immediately—Federal Aid for All States

WASHINGTON, D. C., Nov. 10.—President Harding's signing of the highway bill releases \$75,000,000 for federal-aid roads. Immediate building is expected to start in many quarters with consequent improvement in employment conditions.

Senator Charles E. Townsend has been leading the campaign for the passage of this act, which incorporates most of the principles for which he has been fighting. Primarily it demands that a portion of the Government funds be set aside for upkeep, so that the original investment will not be allowed to deteriorate. Provision is also made for allocating a percentage of the funds for interstate highways. Special provisions are made for forest roads and trails.

The \$75,000,000 appropriated is for the fiscal year ending June 30, 1922, and \$25,000,000 of the sum is available immediately, the balance becoming available on Jan. 1, 1922.

The bill provides that the initiative in locating roads to receive Federal aid shall remain with the States. The law will be administered by the Department of Agriculture through the Bureau of Public Roads. The several State highway departments, with the approval of the Department of Agriculture, shall lay out a system of roads, interstate and inter-county in character, and not interstate alone.

The funds from the several States put up to match Federal aid, from whatever source derived, shall be subject to the direct control of the highway departments of the several States. These shall maintain and keep in good repair at all times all highways constructed with Federal aid. A penalty is provided for failure to put in proper repairs after 90 days' notice from the Department of Agriculture.

### Three Companies Announce Tire Price Reductions

NEW YORK CITY, Nov. 5.—The Firestone Tire & Rubber Co. has reduced its prices 20 per cent on the cords and 10 per cent on fabrics, truck pneumatics and truck solids. This brings the Firestone 30 by 3½ cord to \$19.60, the fabric casing of the same size to \$12.55 and the 36 by 6 truck pneumatic to \$82.65.

The Pennsylvania Rubber Co. of America, Inc., announces a downward revision in the prices of its tires, the reduction representing 15 per cent on all sizes with the exception of Fords, where it is slightly higher.

The Kelly-Springfield Tire Co. has reduced prices 20 per cent on its cord tires, 10 per cent on its fabrics, 15 per cent on its caterpillar truck tires, 10 per cent on its standard truck tires, and from 10 to 20 per cent on its tubes.



## Trucks Force Lower Freight Rates

### Present Agitation for Cuts in Rates a Result of Competition

WASHINGTON, Nov. 2.—Competition by motor trucks has forced railroads to lower freight rates in cases where every other argument has failed. A study of the recent decisions of the Interstate Commerce Commission by a representative of THE COMMERCIAL VEHICLE showed that the cost of hauling by truck has decreased, while the rail carriers are finding it difficult to bring about economies essential to rate reductions. The fact that several short line railroads have suspended operations owing to truck competition is a disturbing factor in the present agitation for cuts in freight rates. There has been some talk of regulation of motor trucks by the Federal Government but there are few who anticipate such action. It is believed that Federal regulation would find little favor in Congress at this time. Some traffic experts insist that laws regulating rail carriers would not be applicable to trucks.

As to the effects of truck competition, the records show that there have been numerous instances where rates on commodities have been reduced on the request of rail carriers. Lincoln Green, vice-president of the Southern Railroad, very frankly admits that competition of trucks forces the lines to reduce their freight rates. He said: "Our purpose in making these reductions in short-haul rates on cotton was primarily to meet truck and wagon competition, not merely within the short radius of the consuming center, but for longer distances to which truck service has been extended, not merely taking cotton away from us at actual railway shipping points, but engaging in the transportation of other commodities in both directions.

"The matter," Green continued, "has been under consideration for more than 12 months and our action is now taken in the belief that it is in the interest of the conservation of our revenues. Whether the proposed rates will actually enable us to meet the competition and continue to control a share of the traffic is a matter of experiment."

Just how it is possible for trucks to quote lower rates for the transportation of commodities has been illustrated by R. A. Brand, vice-president of the Atlantic Coast Line. He declared that the cost of hauling by truck is naturally on the decrease since wages, gasoline, trucks and parts thereof are declining in price. In discussing conditions in a territory surveyed by the Charleston & Western North Carolina Railway of the Southern System, Brand said: "It fairly may be assumed that the trucks are going to handle a certain amount of cotton in the Carolinas regardless of railroad freight rates, just as they are now doing as to freight traffic of all kinds as well as

### \$200 FINE FOR 5 TONS OVERWEIGHT

HARTFORD, CONN., Nov. 4.—A New York owner of a motor truck was fined \$200 and costs, amounting to \$219.31, in the Enfield town court for driving an overloaded truck over the Connecticut state roads. This is the heaviest fine yet imposed in this vicinity. It was due to the fact, the state inspectors allege, that the owner had previously been heavily fined in the Stamford court for the same offense. The load was said to be five tons over the legal weight.

passenger traffic in sections along our lines traversed by improved highways. Trucks make warehouse delivery, which is of value, particularly as to small lots of cotton, since drayage is avoided. A reduction in their rates may turn to the railroads some cotton now hauled by trucks, but the revenue derived from this additional cotton will not, as demonstrated by actual tests already made for our line, affect the loss of revenue on cotton to interior mills alone."

"I do not believe that the interest of southern cotton mills," Brand continued, "are adversely affected by the existing adjustment, nor that the producers of cotton will be benefited one iota by the reduction. A reduction in cotton rates will be an incentive to state commissions to bring about reductions in rates on other commodities, and will also be an invitation to shippers of other commodities to press for a general reduction in their rates."

The Atlantic Coast Line recently filed a petition pointing out that owing to competition, reduction in rates on cotton and cotton linters in the Carolina territory will have to be made in Georgia, Florida and Alabama, with the probability of the reductions extended clear into Texas. These statements indicate that the extension of highway systems throughout the south is the one great factor in motor truck transportation. The railroads knowing that competition of motor trucks lessened on long hauls proposed to reduce the short haul and increase the long haul rates, but the South Carolina commission would not permit this action.

It is interesting to note that the railroads, especially the Atlantic Coast Line, believe that the truck competition can only be successfully maintained in cases in which the haul is not more than 50 miles, and then only in territories in which there are good roads.

There are many other commodities affected by motor truck transportation. Refineries have saved large sums by having their products hauled by motor trucks. This fact is made clear by the application of the San Antonio Southern Railroads and the Texas & Pacific Railways asked permission of the Interstate Commerce Commission to reduce their rates. The San Antonio Southern represented to the Commission that a refinery at Somerset, Texas, contemplated hauling their gasoline products to San Antonio at an estimated cost of 9/10 of a cent per gallon. There are several other cases pending in which the truck is the rate-making factor.

### Wants No Paralleling of Rail Lines

BLOOMINGTON, ILL., Nov. 9 — The Illinois Commerce Commission is not disposed to see the steam or electric railways suffer by the competition of motor buses or trucks and, of late, has been denying a number of petitions filed for certificate of convenience and necessity.

## Bus Franchise Bids Opened in Saginaw

### Six Companies Compete for City Passenger Transportation Rights

SAGINAW, MICH., Nov. 10.—Bids have been opened by the local council for proposals for street transportation and six companies have submitted propositions.

The Wolverine Transit Co., Detroit, asked for a 5- or 10-yr. franchise and agreed to provide thirty or more buses, sell \$125,000 in stock here and charge a 6-cent fare.

The Trackless Transportation Co., New York City, would co-operate with the city in the organization of a \$325,000 company, they to supply half the capital necessary, provide thirty-five buses, charge not less than 7 nor more than 8-cent fares for a franchise of 5 and preferably 10 yrs.

The Saginaw Motor Bus Assn., with forty-six buses now in use, would add larger buses as rapidly as possible, for 5-cent fares. Transfers would cost 2 cents. School children fares would cost 4 cents. The company offers to give \$10,000 in bonds for the exclusive right to the streets for 5 yrs. at no expense to the city.

The Union Motor Truck Co., Bay City, a \$350,000 corporation, is ready to put in \$35,000 in equipment for a 10-yr. franchise, offering thirty-five buses, the fare to be determined by the city.

The Nelson Motor Truck Co., Saginaw, believes it would take forty buses and a \$335,000 company. It offers to aid in the situation.

The Detroit Motor Truck Co. offers sixty 20-passenger buses, 5-cent tickets, 1-cent transfers or a 7-cent cash fare. It would form a \$350,000 company, the city helping to raise this. The company wants a franchise to be determined by the city and guarantees a 10 per cent return.

The Saginaw-Bay Railway Co., which operated the street cars up to August, did not submit a bid. It is bankrupt.

### Price Reductions

CHICAGO, Nov. 7.—The Fargo Motor Car Co. has announced a \$600 price reduction on its 2-ton tractor. The old price was \$2,500.

SPRINGFIELD, MASS., Nov. 8.—The 2½-ton Facto truck has been reduced \$600 to \$2,295.

ST. LOUIS, Nov. 2.—The Tower Motor Truck Co. has reduced prices on its three models as follows:

	Old Price	New Price
1½ ton.....	\$3,000	\$2,900
2½ ton.....	3,475	3,200
3½ ton.....	4,400	4,100

OMAHA, Nov. 3.—The Douglass Motor Corp. has reduced its 1½-ton truck from \$2,050 to \$1,850 and its 3-ton truck from \$3,250 to \$2,950.



## Federal Strike Plan Included Trucks

### Government Will Probably Be Prepared for Future Emergencies With Same Plan

WASHINGTON, Nov. 1.—Plans of the Federal Emergency Organization for the movement of necessities in case of a railroad strike, as made public by Secretary of Commerce Hoover, show that the motor truck was the keynote of the Government's transportation plan. Everything was in readiness for the strike, which was called off. The Motor Transport Division was created with Windsor T. White, of the White Truck Co., as chairman, and Gordon Lee, chief of the automotive section, Department of Commerce, as his assistant.

The plan of operation drafted for the emergency will undoubtedly hold good in the event of a similar condition arising in the future. The organization was to have had headquarters in this city with its primary object the handling of interstate and inter-regional problems, and all other activities were to be left to the local initiative of Governors' organizations.

The program called for the determination of the primary, secondary and tertiary stocks of food, fuel and feed throughout the country. Primary stocks were those available within State radius; secondary, those within interstate water and motor radius and tertiary, those within interstate rail and water radius.

It was also planned to determine the areas dependent upon interstate movement for supplemental supplies. Furthermore, it was believed advisable to ascertain the character of movement, whether by water, rail or truck, required or available.

The Federal authorities, after a series of conferences, arrived at the conclusion that trucks should head the list of transportation units. In addition to the Federal survey they planned to have each locality make its own survey of commodities and the transportation problem. One of the significant features of the plan shows that the utmost reliance was placed upon the efficiency of truck operation. The official report of the plan as distributed to the State organizations, contains statements that two alternatives would be apparent in the service: first, that the railways cease operation and that reliance be placed solely upon trucks and water and second, that limited operation of railways would be maintained.

The Department of Commerce plans to supply graphic maps to State committees showing primary reserves of each commodity available without movement. They intend also to make known the secondary reserves which could be obtained by motor and water movement. The plan called for the establishment of priorities on commodities. It was the idea of the Department to make reports to individual organizations as to truck transportation available and truck mobilization for long and local hauls.

## APPROVES ABOLISHING MILEAGE GUARANTEES

NEW YORK, Nov. 2.—The special committee of the tire manufacturers' division of the Rubber Association of America, which has been investigating all phases of the tire mileage guarantee, has presented its report to the division for adoption or rejection by the individual manufacturers.

While the report will not be made public until it is known definitely whether the general sentiment favors its acceptance, it is understood to recommend strongly the abolition of mileage guarantees. This is done on the theory that all reputable tires are good for more than the number of miles guaranteed and for that reason nothing is to be gained by continuing the practice. It is understood there is little doubt that the recommendations of the committee will be accepted.

The road transport industry has been much concerned over the mobilization points which the Government would select in the event of a strike. The Department of Commerce divided the country into regions under regional representatives. The first region covering the New England States centered at Boston; the States of New York, New Jersey, Delaware, centered at New York City.

In the Middle West, Chicago was the mobilization center selected. It was not determined whether Washington or Pittsburgh would be the center for Maryland, Pennsylvania, Ohio, Virginia, West Virginia and Kentucky. Atlanta was selected as mobilization headquarters for Tennessee, North Carolina, Mississippi, Alabama, Georgia, South Carolina, Florida and Louisiana. Kansas City was chosen as the center for Nevada, Colorado, Kansas, Oklahoma, Missouri and Arkansas, while Houston was to be the point of mobilization for Texas and New Mexico. For Arizona, California, Nebraska and Utah, San Francisco was selected as the central point. Seattle was chosen for Idaho, Oregon and Washington, while Aberdeen or Pierre was decided upon for Montana, Wyoming, North and South Dakota.

## New Accounting System for California Carriers

SAN FRANCISCO, CAL., Nov. 5.—Following the initial steps taken a few days ago by the California State Railroad Commission in placing all motor freight and passenger carriers whose gross income is more than \$20,000 a year under a uniform system of accounting, with annual reports to the commission, it is announced that another hearing will be held in Los Angeles, at a date to be named, but probably late in November, after which the new system of accounting will be put into service.

All automotive carriers are now compelled to make an annual report to the State railroad commission, but the commission believes that a unification of the accounting system will clarify records.

## Bus Terminal Well Organized

### 15,000,000 Passengers Have Passed Through Union Stage Depot in Los Angeles

LOS ANGELES, CAL., Nov. 7.—The Union Stage Depot of Los Angeles established in 1918, has developed into probably the world's largest stage terminal. More than 15,000,000 passengers have passed through the terminal since it was opened.

From a total of less than 3,000,000 passengers carried during 1918 by stages operating out of this depot, motor transportation lines have expanded to accommodate double that amount of traffic. In fact it is estimated that the total number of stage passengers leaving the local terminal during 1921 will exceed 6,000,000.

Systematic organization to expedite service and avoid delays is in evidence from the moment a stage enters the terminal until it leaves the station again for another trip. The moment the passengers of the incoming stage are discharged the stage is run back to the mechanical department. While two men fill it with gas and oil for the next journey, others inspect the engine and tires. If it is necessary to make a tire change it is done with a quick efficiency comparable only to that shown in the pits at the speedway when an important race is on. If the stage needs a bath it is given in a moment. If a temporary ailment has manifested itself under the hood and will require more than a few minutes' attention an extra stage, ready for instant service, is substituted.

Five minutes before departure the stage is run up to the loading platform, the passengers file out of the rest room at the traffic chief's signal and climb into their places in the comfortably cushioned car. Baggage is stored in specially protected racks on the back of the stage or at the side of the hood, and the bus pulls out.

So successful has the Los Angeles terminal proved that co-operative depots have been built in practically every town and city reached by the motor stages in southern California. Thus the whole network of motor stage lines in this territory is welded into one vast unit.

There can be no doubt that California and the West Coast generally is now well ahead of the rest of the country in the matter of up-to-date and well-organized motor bus transportation. But from various signs, the rest of the country is in line to follow its example.

## Pro-Bus Platform Helps Elect Youngstown's New Mayor

YOUNGSTOWN, OHIO, Nov. 9.—One of the planks in Mayor-elect G. L. Oles' platform during the recent campaign was the discontinuance of street car service and the substitution of motor bus transportation.



## To Establish Motor Transport School

### Allied Motor Commerce to Educate Men for Executive Work in Trucking Field

INDIANAPOLIS, Nov. 4.—At a meeting of the Ways and Means Committee of Allied Motor Commerce of Indiana, held here yesterday, a considerable amount of expansion was planned for the activity of this organization which embraces nineteen State-wide organized industries which employ the motor truck in great numbers. First it was decided to draw up plans for the founding at Indianapolis of a national motor transport school for the education and training of executives for highway transport organizations.

This school with the great new motor truck terminal that is to be erected in Indianapolis by the Indiana Highway Transport and Terminal Assn., aided by substantial industries that are vitally interested in motor transport, will give facilities for the study and advancement of motorized freight hauling second to none. Because of the 7 years of organized effort in Indianapolis and vicinity in the broad use of the motor truck for urban and highway traffic, it is recognized by transportation and automotive authorities who have been consulted that this is the ideal location for such a school. The fact that the truck has made such organized headway in Indiana, which was the first great center of inter-urban electric systems, and still continues one of the most important in the country also points to the location as one of the ideal places in the country for intensive study that will give results.

As part of the education work the Ways and Means Committee also decided upon consists in the collection of all manner of data and the dissemination of this through an information bureau, the school and the modern terminal soon to be erected will prove highly useful.

### Minneapolis Truck Terminal Established

MINNEAPOLIS, MINN., Nov. 8.—The Minneapolis Truck Terminal, Inc., is a new corporation to establish a joint motor truck terminal as the outcome of action by the jobbers who objected to the expense and the loss of time in making the several existing terminals of the sixteen operating lines to deliver goods. The company is a mutual service corporation. Expenses will be prorated.

A temporary terminal has been established at 334 First Street, N., with the Security Warehouse Co. A permanent terminal is expected to be erected. Business will be increased 25 per cent, it is prophesied, by this new co-operative move, which in reality will be perpetuation of the business established two years ago and which the wholesalers threaten to abandon under the distributed plan of terminals.

## OSHKOSH DELIVERS "GROCERY STORES"

OSHKOSH, WIS., Nov. 1.—Four large "traveling grocery stores" have been built by the Oshkosh Motor Truck Co. and delivered under their own power to the U-Save-It Stores Corp. of Dayton, O., during the past week.

The cars were built on the standard four-wheel-drive chassis of the Oshkosh company and equipped with special bodies built by the J. L. Clark Mfg. Co. of Oshkosh. The Dayton company is conducting a "motor groceretaria" business, bringing a complete grocery store in miniature to the doors of housewives.

Officers of the corporation are: President, H. R. Belitz; vice-president, W. L. Ward; secretary, F. P. Raymond; treasurer, J. F. Hamlett; directors, C. G. Steller, A. F. Quandt, G. L. Odell.

Of sixty trucks in the combined fleet of 4- to 5-ton trucks at least forty are in daily use, which carry more than 20,000 tons of merchandise a year within 100 miles radius, valued at between \$4,000,000 and \$10,000,000.

It is estimated overhead of the interested truck companies will be cut in half, that the terminal will be more easy to find and therefore will be more of a figure in the city's business prestige, and that there will be enough more business for the companies to permit a rate cut. Among the principal outbound terminals are Rochester, 91 miles; Milaca, 70 miles; St. Cloud, 63 miles, and Hutchinson, 58 miles.

### Agree on Graduated Tax

NEW ORLEANS, Nov. 1.—A graduated license tax on tonnage and a flat rate of 68 cents per hp. on trucks and buses has been agreed upon by a committee of the Louisiana Legislature. The license which will be in addition to the 68 cents per hp. has been graduated as follows:

750 to	4000 lb. trucks....	\$10.00 per M
4001 to	5000 lb. trucks....	12.50 per M
5001 to	6000 lb. trucks....	15.00 per M
6001 to	8000 lb. trucks....	20.00 per M
8001 to	10000 lb. trucks....	25.00 per M

The license proposed for buses would apply as follows: 1 to 7 passengers, \$2.50 per passenger; 8 to 20 passengers, \$3 per passenger.

## Coming Events

1921	
Nov. 14-19,	Jersey City, N. J. Truck Show, Fourth Regiment Armory.
1922	
Jan. 19-25,	Milwaukee, Wis., Truck Show, Auditorium
Jan. 30-Feb. 2,	Boston, 6th Annual Conference of International Delivery Ass'n at Copley Plaza Hotel.
Feb. 6-9,	Scranton, Pa., Truck Show, Armory.
Feb. 12,	Madison, Wis., Truck Show, Cartwell Bldg.

## Averages 21.9 M.P.H. Across Continent

### Goodyear 6-Wheel Truck Makes Trip in 6 Days, 15 Hours and 23 Minutes

NEW YORK CITY, Nov. 5.—The Goodyear six-wheel truck of 5 to 6-ton capacity, which recently smashed the record between Akron and the Pacific Coast, broke its own records and all existing transcontinental truck records on the return trip between Los Angeles and New York City.

For the 3507-mile journey under all kinds of road conditions the truck broke the tape at New York in 6 days, 15 hrs. and 23 min. actual running time. The total elapsed time was 12 days, 14 hrs and 28 min. The average speed for the entire trip was 21.9 m.p.h. This included the climb over the Rockies and the Appalachians and the drag through muddy gumbo roads in the Mississippi Valley. The trip was made over the Santa Fe trail to Kansas City and via the Lincoln Highway through a considerable portion of the East.

The fastest single day's run was 420 miles, made in 17 hrs. through New Mexico and Arizona.

### Store Delivery Heads to Discuss Trucking Problems

NEW YORK CITY, Nov. 10.—The Sixth Annual Conference of the International Delivery Assn., an association having as its members leading dry goods and department stores throughout the United States and Canada, is fast completing its arrangements. Space has been secured at the Copley Plaza Hotel at Boston to conduct these meetings which will be held Jan. 30, 31, Feb. 1 and 2, 1922. The program which is now under course of construction promises to be extremely interesting and will bring out a great many points of an educational nature.

While this association is primarily made up of dry goods and department stores, an invitation is extended to retailers in any line who are interested in studying ways and means for the betterment of their delivery systems. Last year it will be remembered that this association took up at its meeting in Pittsburgh the question of the advisability of parcel post delivery, the outcome of which has done a good deal to clarify the possibilities of this system.

In addition to the regular meetings at which intricate problems will be discussed arrangements have also been made to allot space for exhibition purposes. This will give visiting merchants to this convention an opportunity to study various kinds and makes of equipment for economical delivery.

For further particulars on this convention please communicate with Burton M. Arrick, manager store service and equipment department, Dry Goods Economist, 241 West 39th Street, New York City.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Reg. U. S. Pat. Off.

## THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President

W. I. Ralph, Vice-President

E. M. Corey, Treasurer

A. B. Swetland, General Manager

David Beerscott, Directing Editor

U. P. O. Building

239 West 39th Street, New York

## CONTENTS

Vol. XXV, No. 9

December 1, 1921

### LEADING ARTICLES

The Last Link in Transportation .....	8
Why Truck Transportation Pays .....	12

### MISCELLANEOUS ARTICLES

Some Important Hints on Fitting Bearings Too Tight .....	14
Cutting the H. C. of Washing .....	15
Truck Haulage Is Reliable .....	16
And the Job Higher Up? .....	17
Cost Accounting Promotion .....	18

### DEPARTMENTS

The Better Way .....	20
Buyers Department:	
Mack Rail Cars to Be Placed in Service on Branch Lines of N. Y., N. H. & H .....	24
Commerce Brings Out "Store at Your Home" Model .....	25
Truck Accessories .....	26
Shop Equipment for Fleet Owners .....	28
Trolley Bus Mounted on Truck Chassis .....	30
Motor Truck Electric System Wiring Diagrams .....	31
The Fleet Owners' Forum .....	32
Editorial: Value Prices on Trucks .....	34

### NEWS

Tire Makers Make Big Price Reductions .....	35
Old Truck Taxes Are Retained .....	35
Terminal Delays Are Costly in England .....	36
Must Obey Laws or Stay Off Roads .....	36
Considers Safety and Road Wear .....	37
Des Moines to Vote on Bus Issue .....	37
Mileage Guarantee on Tires Dropped .....	38
Decatur Bus Lines in Merger .....	38

Index to Advertisers.....74-75

## The Commercial Vehicle

Charles W. Blackman, General Manager

EDITORIAL DEPARTMENT

Sinclair Gluck, Managing Editor

F. Eugene Spooner, Technical Editor

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under 1st of class, March 3, 1879.

### BRANCH OFFICES

Chicago, Mallory Building, 59 East Madison Street  
 Detroit, 317 Fort Street West  
 Cleveland, 536-540 Guardian Bldg.  
 Philadelphia, 1420-1422 Widener Bldg.  
 Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law .....	.50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



There is no  
Substitute -  
FOR

Wyman-  
Gordon  
Quality  
and  
Service

**WYMAN · GORDON**  
*The CRANKSHAFT MAKERS*  
 WORCESTER, MASS. CHICAGO, ILL. CLEVELAND, OHIO

# EMPRESS

## HIGH PRESSURE LUBRICATING SYSTEM

*For All Motor Cars and Trucks*



*One hand operates it*

### Saves Time and Unnecessary Labor

Lubricating the motor car or truck, even at best, cannot be classed as a pleasant task; car and truck owners are quick to appreciate and vitally interested in any device which will lighten this work. They realize that proper lubrication is absolutely necessary to the economical maintenance of their machines and they want to secure it as easily and conveniently as possible.

That is the big reason behind the quick and ready sale which the dealer experiences for the Empress High Pressure Lubricating System.

### Positive Results

With the Empress System, everything can be done that can be accomplished with any similar system and done more quickly, more easily, more effectively and with less inconvenience.

One hand operates it. Can be used with either grease or oil as the lubricant. A pressure or gravity system, convenient, quick and easy to operate. Cleans and lubricates.

### Profitably Handled

Ready selling; it insures the dealer of quick and frequent turnovers and allows him a liberal margin of profit.

## Bowen Products Corporation

*Manufactured by Bowen Products Corporation*

New York, N. Y.  
Waukegan, Ill.  
Chicago, Ill.  
Minneapolis, Minn.  
Canadian Factory:  
Waukegan, Ill.

*Branch Sales Offices*

New York, 225 Broadway  
Chicago, 1007 O'Leary Bldg.  
Boston, 453 Washington St.  
Richmond, Va., 311 American Nat'l Bank Bldg.  
San Francisco, Mohrman Bldg.  
Butte, Mont., 603 E. Platinum St.

*Write Today For Descriptive Folder A*



# The COMMERCIAL VEHICLE

Read by Fleet Owners

Vol. XXV Dec. 1, 1921 No. 9

## Forging the Last Link!

One Motor Transport Line as  
Well Organized as a Railroad

### FREIGHT SERVICE

Daily Except Sundays

#### LEONARDTOWN-SCOTLAND ROUTE

FERRY CONNECTION WITH McGUIRE'S WHARF, VA.

From Washington	
Leave Washington	8:00 A. M.
Arrive Leonardtown	11:00 A. M.
Leave Leonardtown	2:00 P. M.
Arrive Scotland	4:00 A. M.

To Washington	
Leave Scotland	12:00 P. M.
Arrive Leonardtown	2:00 P. M.
Leave Leonardtown	5:00 P. M.
Arrive Washington	9:00 P. M.

#### ROCK POINT ROUTE

From Washington	
Leave Washington	8:00 A. M.
Arrive Rock Point	10:00 P. M.

To Washington	
Leave Rock Point	12:00 P. M.
Arrive Washington	9:00 P. M.

#### INDIAN HEAD ROUTE

From Washington	
Leave Washington	8:00 A. M.
Arrive Indian Head	11:45 P. M.

To Washington	
Leave Indian Head	2:00 P. M.
Arrive Washington	9:00 P. M.

#### COLONIAL BEACH ROUTE

From Washington	
Leave Washington	4:00 P. M.
Arrive Colonial Beach	12:00 Noon

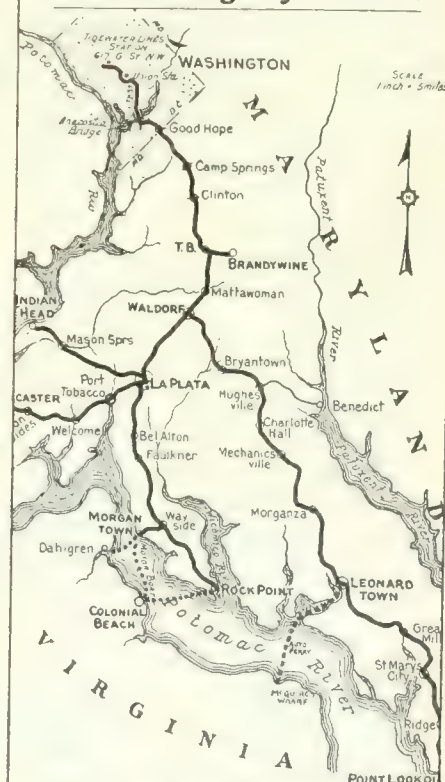
To Washington	
Leave Colonial Beach	6:15 A. M.
Arrive Washington	9:00 P. M.

THE Tidewater Lines, in Southern Maryland, pioneering as the railroads once pioneered, are now handling most of the passengers and freight of half a state with trucks and buses.

They travel on schedule, charge fixed rates, operate on time to the minute and are financed by the people they are serving.

Read about this vision and development in the next four pages.

### Railroading by Truck!



#### TIDEWATER LINES, INC.

Motor, Passenger, Express, Freight Transportation  
Main Terminal and General Offices,  
613 G St. N. W., Washington, D. C.  
Franklin 2040 2041 Telephones Franklin 7050, 7099

Part of the freight service schedule  
used by the Tidewater Lines, Inc.

Routes covered through Southern  
Maryland by the Tidewater vehicles

# The Last Link in Transportation

*The Tidewater Lines, Inc., Is the Greatest Step Yet Taken in Developing Transportation by Road*

By F. Eugene Spooner

WHAT the Tidewater Lines, Inc., of Maryland has accomplished today indicates what other motor freight and passenger haulage lines, with the same vision and organizing ability and the same willingness to serve the public, can accomplish throughout the country in the days to come.

The Tidewater Lines, Inc., is a natural development in the evolution of the transportation of the United States. The railroads in most instances have found that the short haul business is not a money maker, and as

a result, the shipper has suffered through inadequate service. That is the case, even where the railroads are available. But railroads are not flexible and they have served and can serve only a limited territory. In other territories potential shippers have had no service at all, good or bad, and the territories have remained undeveloped.

Motor bus and freight haulage companies have stepped into the gap left by the railroads. And the Tidewater Lines is the highest development of this new service. For instead of a

casual service, operated on a shoe string, it is giving the inhabitants of a very large district a service for both freight and passengers as accurate, as reliable, as well organized and as efficient as any railroad.

## How the Lines Grew

About 10 years ago the State of Maryland entered upon a vigorous road building program; at first under the State aid plan, and a little later under the State highway plan, by which the State obligated itself to construct a system of main highways. In that section of Maryland lying south of Washington, known as Southern Maryland, the State system includes one main highway from Washington. This highway is about 80 miles in length. A branch road extends from Waldorf through La Plata to Rock Point on the Potomac and other branch roads extend from La Plata to Indian Head and to Doncaster. These cover about 62 miles, making a total of 142 miles of main highways over which the motor buses and trucks may be efficiently and economically operated.

Before these roads were improved the only means of transportation available was a single short line railroad. Some of the river and bay points were served by steamboats. The time consumed in making the trip up to Baltimore and Washington and return required from 3 to 4 days and sometimes longer.

About 9 years ago the Semmes bus line was established, between Washington and various points in Southern Maryland with the idea of furnishing this territory with quick and easy passenger and freight transportation to Washington. This service was continued until a year ago when the company was reorganized under a new management, the Tidewater Lines, Inc.

The development of the Tidewater Lines has been really remarkable. This company serves a large expanse of country, operating at this time of the year about 2,000 miles of passenger service per day and about 1,500 miles of freight service. Users of this service can now make the trip that formerly took 3 to 4 days within 3 hours.

Fish, oysters, livestock and produce from the lower Potomac may be placed on the New York markets within 12 hours.

About thirty-five vehicles are used for the transportation of passengers and freight. The motor buses have capaci-

## Passenger Time Table

### TIDEWATER PASSENGER SERVICE

Fast motor coaches, heated and electrically lighted, with ample window space, insure passengers over these lines a quick, clean, comfortable trip to their destination.

All motor coaches are equipped with giant pneumatic tires, shock absorbers, special springs and all the latest motor improvements.

A fast dependable schedule is maintained throughout the year.

Each bus is provided with a baggage compartment in which hand baggage is carried.

This service covers all of the state roads of Southern Maryland. Direct connections by ferry are maintained with McGou's Wharf, Dahlgren, Potomac Beach and Colonial Beach, Virginia. Special party rates furnished upon request.

### BRANDYWINE ROUTE

Washington to Brandywine		Week Days		Fares	
Miles	Leave	Arrive	Time	One Way	Round Trip
0	Washington	7:30	A.M.	4.45	
1	McCabe's	7:55	5:10	\$0.30	
2	Silver Hill	8:05	5:20		
3	Godwin's Corner	8:10	5:25		
4	Wood's Corner	8:15	5:30		
5	Wood's Corner	8:20	5:35		
6	Jenkins's Corner	8:25	5:40		
7	Clinton	8:30	5:45		
8	Blacksmith Shop	8:35	5:50		
9	Moore's Gate	8:40	5:55		
10	Blair Road	8:45	6:00		
11	Thompson's Gate	8:48	6:03		
12	T. B.	8:50	6:05		
13	Arrive Brandywine	9:00	6:15	1.05	\$1.90

Brandywine to Washington		Week Days		Fares	
Miles	Leave	Arrive	Time	One Way	Round Trip
0	Brandywine	6:45	A.M.	3.45	
1	T. B.	6:55	4:55		
2	Thompson's Gate	6:57	5:07		
3	Blair Road	7:00	5:10		
4	Moore's Gate	7:05	5:15		
5	Blacksmith Shop	7:10	5:20		
6	Clinton	7:15	5:25		
7	Jenkins's Corner	7:20	5:30		
8	Wood's Corner	7:25	5:35		
9	Wood's Corner	7:30	5:40		
10	Godwin's Corner	7:35	5:45		
11	Silver Hill	7:40	5:50		
12	McCabe's	7:50	6:00		
13	Arrive Washington	8:15	6:15		

Washington to Brandywine		Sundays		Fares	
Miles	Leave	Arrive	Time	One Way	Round Trip
0	Washington	8:30	A.M.	4.45	
1	McCabe's	8:55	6:10		
2	Silver Hill	9:05	6:20		
3	Godwin's Corner	9:10	6:25		
4	Wood's Corner	9:15	6:30		
5	Wood's Corner	9:20	6:35		
6	Jenkins's Corner	9:25	6:40		
7	Clinton	9:30	6:45		
8	Blacksmith Shop	9:35	6:50		
9	Moore's Gate	9:40	6:55		
10	Blair Road	9:45	7:00		
11	Thompson's Gate	9:48	7:03		
12	T. B.	9:50	7:05		
13	Arrive Brandywine	10:00	7:15		

### BRANDYWINE ROUTE

Brandywine to Washington		Sundays		Fares	
Miles	Leave	Arrive	Time	One Way	Round Trip
0	Brandywine	8:05	A.M.	4.45	
1	T. B.	8:15	6:15		
2	Thompson's Gate	8:20	6:20		
3	Blair Road	8:25	6:25		
4	Moore's Gate	8:30	6:30		
5	Blacksmith Shop	8:35	6:35		
6	Clinton	8:40	6:40		
7	Jenkins's Corner	8:45	6:45		
8	Wood's Corner	8:50	6:50		
9	Wood's Corner	8:55	6:55		
10	Godwin's Corner	9:00	7:00		
11	Silver Hill	9:05	7:05		
12	McCabe's	9:10	7:10		
13	Arrive Washington	9:15	7:15		

### \*LEONARDTOWN ROUTE

Washington to Leonardtown		Week Days		Fares	
Miles	Leave	Arrive	Time	One Way	Round Trip
0	Washington	8:05	A.M.	4.00	
1	Waldorf	8:20	6:15		
2	Waldorf	8:30	6:25	\$1.30	\$2.30
3	Beantown	8:40	6:35		
4	McIntosh	8:50	6:45		
5	Beantown	9:00	6:55		
6	Hughesville	9:10	7:05		
7	Indian Head	9:20	7:15		
8	Charlotte Hall	9:30	7:25		
9	Marshallville	9:40	7:35		
10	Three Notch Road	9:50	7:45		
11	Marshallville	10:00	7:55		
12	Hales	10:10	8:05		
13	Morganza	10:20	8:15		
14	Laurel	10:30	8:25		
15	Washington	10:40	8:35		
16	Arrive Leonardtown	11:00	8:40	3.00	7.45

### Leonardtown to Washington

Miles	Leave	Arrive	Time	One Way	Round Trip
0	Leonardtown	7:45	A.M.	4.00	
1	Waldorf	7:55	6:15		
2	Waldorf	8:05	6:25	\$1.30	\$2.30
3	Beantown	8:15	6:35		
4	McIntosh	8:25	6:45		
5	Beantown	8:35	6:55		
6	Hughesville	8:45	7:05		
7	Indian Head	8:55	7:15		
8	Charlotte Hall	9:05	7:25		
9	Marshallville	9:15	7:35		
10	Three Notch Road	9:25	7:45		
11	Marshallville	9:35	7:55		
12	Hales	9:45	8:05		
13	Morganza	9:55	8:15		
14	Laurel	10:05	8:25		
15	Washington	10:15	8:35		
16	Arrive Washington	10:40	8:40	6.40	

\*Bus Leaving Washington 12 Noon makes direct connection with Ferry for McGou's Wharf Va. Leaves Washington 7:45 A. M. and 1:40 P. M. makes connection with Ferry from McGou's Wharf Va.

### SCOTLAND ROUTE

Leonardtown to Scotland		Week Days		Fares	
Miles	Leave	Arrive	Time	One Way	Round Trip
0	Leonardtown	7:45	A.M.	4.00	
1	Waldorf	7:55	6:15		
2	Waldorf	8:05	6:25	\$1.30	\$2.30
3	Beantown	8:15	6:35		
4	McIntosh	8:25	6:45		
5	Beantown	8:35	6:55		
6	Hughesville	8:45	7:05		
7	Indian Head	8:55	7:15		
8	Charlotte Hall	9:05	7:25		
9	Marshallville	9:15	7:35		
10	Three Notch Road	9:25	7:45		
11	Marshallville	9:35	7:55		
12	Hales	9:45	8:05		
13	Morganza	9:55	8:15		
14	Laurel	10:05	8:25		
15	Washington	10:15	8:35		
16	Arrive Scotland	10:40	8:40	6.40	

Scotland to Leonardtown		Week Days		Fares	
Miles	Leave	Arrive	Time	One Way	Round Trip
0	Scotland	7:45	A.M.	4.00	
1	Waldorf	7:55	6:15		
2	Waldorf	8:05	6:25	\$1.30	\$2.30
3	Beantown	8:15	6:35		
4	McIntosh	8:25	6:45		
5	Beantown	8:35	6:55		
6	Hughesville	8:45	7:05		
7	Indian Head	8:55	7:15		
8	Charlotte Hall	9:05	7:25		
9	Marshallville	9:15	7:35		
10	Three Notch Road	9:25	7:45		
11	Marshallville	9:35	7:55		
12	Hales	9:45	8:05		
13	Morganza	9:55	8:15		
14	Laurel	10:05	8:25		
15	Washington	10:15	8:35		
16	Arrive Leonardtown	10:40	8:40	6.40	

The Tidewater company's passenger time table is similar to that of a railroad schedule, giving the time of leaving and arrival as well as the full rates for the various routes



ties of 16, 24 and 30 passengers. All of the buses and trucks are equipped with pneumatic tires and travel at speeds ranging from 25 to 30 m.p.h.

### Schedules Maintained

The Tidewater Lines operate with the accuracy and efficiency of a railroad. The passenger buses and trucks operate on orders issued by the dispatcher at division headquarters and the dispatcher receives by telephone reports indicating when each vehicle passes through the various towns and villages on the system.

The company pays particular attention to the maintenance of schedules. Breakdowns and other delays are reported immediately and a spare vehicle is always at hand to take the place of any disabled vehicle. The company has gone so far as to send an empty bus through from one end of the line to the other in order to take care of a temporary shortage in equipment through accident. Schedules must be maintained at all costs.

### Complete Confidence Won

A transportation business carried on with this thoroughness is bound to win approval and complete confidence of its users. And this is just what has happened down in Southern Maryland. That section of the State is now in close contact with the principal markets in this part of the country. The people have kept pace with the demands for their products and have in turn benefitted by the introduction of modern farm implements, etc. Speedy transportation service has opened their eyes to the introduction of new industries. It has led to stock raising.

Very little of this was done before on account of poor transportation facilities. The boats touching the various ports on the coast of Maryland made no provisions for cold storage while in transit. The long trip by boat made this imperative. Butchered products sent by motor truck can now be shipped to Washington and Baltimore immediately and without spoilage, because of the rapidity of the transportation facilities to these two points.

### Increased Land Values

Land values down in Southern Maryland since the inception of truck transportation have increased tremendously. According to reports of the United States Census, taxable valuation of farm lands in a number of the counties are 146 per cent higher than 10 years ago. These are the largest increases in the state.

Ten years ago it would have been possible to buy thousands of acres of good land in these counties for from \$10 to \$15 an acre. Today these same lands cannot be bought for less than \$100 to \$150 per acre. It may be said without fear of contradiction that these increases in values are due almost entirely to good roads and better means of transportation.



Upper—One of the repairshops conveniently located along the routes of the Tidewater bus and freight service. Center—This mode of transportation is still seen on the roads through Southern Maryland and indicates in no small degree what modern transportation facilities when eventually sold to the farmer will mean to him in the saving of time and labor. Lower—Daily scene at the Washington terminal of the Tidewater company. Note the baggage carrier at the rear of the bus body in the above illustration.





Upper—One of the Tidewater country way stations. These stations are standard, containing rest rooms, lunch counters, etc. The company also takes care of the local demand for gasoline. Center—The Tidewater buses and trucks make direct connection with the company-owned ferry which leaves for McGuire's Wharf and other points in Virginia. Lower—The buses are equipped with giant pneumatic tires and as a result are comfortable to ride in. The buses are also heated and electrically lighted

The system is blocked off into divisions with Waldorf as the center and main division point, all vehicles operating from that point. Each division is about 25 miles or 1 hour's run in length. The larger buses and trucks are used on the main line between Waldorf and Washington and the smaller equipment on the branch lines except when the service requires heavier equipment on the branch lines. The main garage which includes a complete and up-to-date repair shop, a freight house where all freight is unloaded, weighed and manifested and a waiting and lunch room are located at Waldorf. Waiting rooms and freight houses are also located at other terminals.

Reserve equipment is kept at terminal points and division headquarters. A damaged bus or truck arriving at these points is always replaced by another which is ready to carry out the schedule.

Previous to the reorganization of this company all equipment operated out of Washington. This made it necessary to operate more equipment over the main line than was actually needed to provide good service. It has been found that by operating from the hub or center of the system much duplication of travel is avoided. This is effective in reducing operating expenses and is considered one of the most important and efficient innovations yet made in the standardization of motor vehicle transportation. In this respect it differs from that of railroad operation which is usually handled from the terminals.

### Without Competition

The Tidewater Lines operate without any appreciable competition from railroads or other sources. Yet despite this fact, there has been no let-down in the quality of transportation service since the truck company has started. With an organization paralleling that of a railroad, the company has risen not only in the estimation of the farmers and others in the southern part of Maryland but has drawn the favorable attention of the Public Service Commission in that state.

The Public Service Commission has been looking for some management or corporation capable of concentrating all the passenger and freight lines over the fine roads of Maryland into one efficient system like the railroads. The present state administration is endeavoring to make a record by merging all the state lines under one executive, responsible head, knowing how much better service this will mean to the public at large. The Tidewater Lines has been selected.

### State Wide Eventually

The Governor of Maryland, who appoints the Public Service Commission, personally went over the Tidewater system and after a thorough inspection was convinced that this company should be given a franchise over the state roads down in Southern Maryland and for the whole state when financially able to do so. This will necessitate the purchase of hundreds of trucks as well as the addi-



tion of staffs, terminals and other equipment.

Following this program, this company recently purchased the Arndt Transfer & Express Co., which operated trucks out of Baltimore through the northern and western sections of the state. The Tidewater Lines now maintain a terminal in Baltimore. This city will, in the near future, be the center of this company's operations in Maryland. With this plan in view, locations are now being investigated for a terminal, to be used to house all bus equipment, to provide waiting rooms, ticket offices and freight terminals, etc.

Land has also been purchased in the outskirts of Washington for the purpose of constructing a terminal for the Southern Division. Experience has taught the management that the high-powered buses used on the roads are very difficult to handle within the city limits; also, terminal facilities in the center of the city are very expensive.

### To Build Their Own Road

In the pioneer days, there were no homes to be bought, so the people built them. Conditions facing the Tidewater Lines on one particular road between the southern part of the state and Baltimore are so similar to the pioneering days that the company may be classed as a pioneer through that section of highway. This particular stretch of road enables the company to cut off Washington on a trip from the southern part of Maryland to Baltimore and as a result is a great saver of time. But this road is now in such need of repairs that it is well nigh impassable. The company must use the road, therefore it is going to rebuild it.

The bus equipment now used is special in every way. Each bus is equipped with high-speed engines, specially reinforced frames, giant pneumatic tires, etc. The buses are heated and electrically lighted. Each vehicle is kept in first class condition. A night and day repair force is maintained so that repairs can be made at any time. The shops are so systematized that should an engine go bad in any one vehicle, a new power-plant could be installed within a space of 2½ hours. It is stated that no bus or truck is laid up longer than from 1½ to ¾ of a day, unless it is in the shop for general overhaul and renewal.

The engines are run a stated length of time and then overhauled. The worn parts of the chassis, as well as the body are replaced once every 4 months and painting and upholstering are put in first-class condition at the same time. In other words, the entire equipment is practically renewed once every 4 months or three times a year. This, of course, depends upon the mileage that the vehicle makes.

### Financed by Patrons

In view of the fact that the company is now preparing to install standard truck equipment as well as incur the expense of building the new terminals,

(Continued on page 36)



Upper—One of the country freight stations along the routes of the Tidewater Lines. The farmers and other users of this service bring their products here to be collected by the trucks. At the same time they collect whatever material that has been sent in to them from Washington. Center—Buses lined up in front of the Tidewater terminal in Washington. This terminal contains a waiting room and ticket office. Lower—One of the trucks about to be loaded at a country freight station



# Why Truck Transportation Pays

*How Trucks Have Taken Over a Large Part of the Haulage Business of the Nation, How They Have Developed Business and Grown Up with It*

By F. W. FENN\*

EVERYONE knows what highways meant to the Roman Empire—she could not have existed without them. They were built so well that they remain to this day—a mute evidence of her pristine greatness.

We should build, as Rome built, for permanence, for our highways have come back into their own. The building of our railways temporarily displaced them with their slow-moving traffic, but they have come back, a little changed, with a well built foundation and a hardened surface. The gasoline engine is responsible for this rejuvenation; it is responsible for the appropriation by the Federal Government of \$75,000,000 for an immediate road-building program; it is responsible for the large use of motor trucks and passenger automobiles that are in service today.

## What Motor Vehicles Carried

Five billion passengers, or nearly four times the 1,234,000,000 revenue passengers of the steam railroads, were carried in motor vehicles in this country last year. These figures represent an increase of 400,000,000 over the preceding year. Twelve hundred million tons of freight were shipped in motor trucks last year. According to the United States Bureau of Crop Estimates 134,400,000 tons of farm products are carried in motor trucks to the railway over the highways annually, in addition to huge amounts of farm tonnage which goes in trucks direct between farm and market.

Big savings effected by the use of motor trucks with corresponding savings in time by the elimination of delays in the shipping of goods are becoming more and more pronounced as shippers, dependent upon efficient transportation systems for business success, continue to increase their truck installations. They have found that the motor truck affords an independent transportation service dependent in no way on agencies outside their own organization; a condition that not infrequently is of inestimable value to the shipper when goods must be moved quickly.

In a report of a Special Committee, appointed to investigate motor transportation in New England, to the chairman

of the executive committee of the New England Traffic League, attention is called to the fact that it often takes 216 hours to ship by rail from Bridgeport to New York, a distance of 56 miles, and 4 or 5 days between points in Connecticut less than 40 miles apart. In other instances, delays of from 2 to 7 days have resulted on distances of from 50 to 100 miles. The report states these two factors are largely responsible for the increased use of motor transportation.

## The Big Review Number!

On January first, 1922, will be published the Annual Review and Specification issue of THE COMMERCIAL VEHICLE.

The issue will contain the specifications of all motor trucks now manufactured, arranged in a novel and convenient way and including all the details the buyer wants.

The issue will also contain a valuable review of the industry from the truck user's point of view.

And there will be many other features of great interest to owners and operators of motor trucks.

## Keep It on Your Desk

The committee has been able to develop within the short time it has had for this study the fact that it is not uncommon for some shippers in New England to transport practically all their goods to New York City by motor truck. Shippers located west of New London state that they do a large amount of local business by motor truck and that this means of transportation is used to quite an extent on the long haul traffic into New York City.

An examination of the costs of door-to-door delivery of first class l.c.l. freight from New York to New Haven will be of interest in this connection. The distance is 74 miles. The flat freight rate is 63 cents; the total cost by rail per

hundred pounds is \$1.28; this total is arrived at by adding to the freight rate the necessary teaming charges at both ends, which amount to 30 cents, the cost of extra boxing, which amounts to 24 cents, plus extra freight charge on increased weight of boxing, which amounts to 17 per cent of the freight rate. On the other hand, for the same distance the motor truck rate for one hundred pounds is \$1.10, a difference of 18 cents; while the trouble and expense of extra boxing and crating are automatically eliminated by the use of trucks. In addition to the actual rate saving by motor truck there is also a saving of 108 hours in time, as it takes 120 hours by rail. I am sure that striking comparisons of this character will be discovered at most of the terminal distribution points through which these goods pass.

## Truck Best Available Unit

In the cases of those houses which have jobbing divisions and are under the necessity of transporting goods frequently between important centers, such as New York and Boston and Philadelphia, it is apparent that the motor truck is the best transportation unit to use. This has been done in other fields of merchandising with marked success, as can be seen from the following cases.

The George E. Keith Company operates or controls nine factories with a total capacity of 24,000 pairs of shoes daily. Of these nine plants, one is in South Boston, and another in East Weymouth, Massachusetts; each is 20 to 25 miles from the parent factory at Brockton. A third is in North Adams, Massachusetts; 160 miles to the northwest. Each factory performs a special function in the operation of the whole, making necessary constant transfer of goods between the plants.

## Hauled 11,000 Tons

Until a little more than a year ago the company had all its hauling done by rail. Then Carlton R. Blades, traffic manager, decided that trucks could do the work more economically and give better service. Three 5-ton trucks and one 2-ton truck were put into service; the work that these trucks accomplished in a year is decidedly interesting.

Over the eleven month period these trucks hauled more than 11,000 tons of materials to and from Boston at about one-half the cost of the methods for-

\*Secretary of the National Truck Committee of the National Automobile Chamber of Commerce.



merly used; they also improved the service by about one hundred per cent. When they formerly sent their products by rail they usually got their deliveries on the day after they were shipped from Brockton to Boston. With trucks they now get their loads to Boston and the materials back from the factories on the same day that they are shipped.

Cowperthwait & Sons is the oldest retail furniture house in America, having been established in 1807. The majority of their customers live in or near the cities and towns within 200 miles of New York. Formerly the company made all of its out-of-town deliveries; even to nearby points, by railroad.

## Trucks Mean Better Service

"Since we began delivering by motor truck several years ago our business has greatly increased because of the better service given our customers," recently declared P. L. Baker, department manager for Cowperthwait & Sons, whose two stores are located in New York City.

"But," he said, "people expect prompt delivery of their purchases and will not stand for the delay and high cost of shipping by freight. Deliveries on Long Island, and across the river in New Jersey, Paterson, Elizabeth and other nearby cities, are made daily, or as often as necessary to handle the trade. The schedule is adapted to the amount of goods to be delivered.

## Only Trucks Can Handle It

"It is easy to see to how large an extent our business is dependent upon motor trucks. Horses could not possibly make these long hauls, and freight is too expensive and not dependable. With our trucks we are sure of getting their purchases to our customers when promised, and of having the goods reach them in good shape. Furniture shipped by freight always suffers some damage in transit. Our trucks eliminate all danger of the goods being scratched, broken or lost, and our customers appreciate this."

Eight years' experience with a mixed fleet of horse vehicles and motor trucks has convinced Robert Gair & Company of Brooklyn that this system is not economically sound. The horse-drawn vehicles have been discarded gradually since 1911. Only the pressure of war conditions prevented the complete motorization of the company's transportation system taking place before this.

## Demountable Bodies Used

Many companies are using duplicate demountable bodies. In this manner one body may be loaded while the truck is hauling the other. In some cases small wheels are attached to the truck bodies so that they may be rolled from and to the chassis.

Fifteen demountable bodies and ten trucks have enabled one company in the East to handle a 300 per cent increase in business without the addition of more trucks. Incidentally, the elimination of the need for increasing the size of the loading and unloading platforms was

also made possible. For it is readily apparent that, if the company had had to add at least twenty trucks with fixed bodies instead, to take care of the expansion in the business, larger loading and unloading platforms would have had to be built at its warehouse to take care of the increase in the size of the company's fleet. Under the new arrangements the work capacity of the trucks has been doubled, as the loading and unloading time has been decreased from one hour to from 5 to 10 minutes; and



## What Trucks Have Done

In this article, W. A. Fenn, Chairman of the Motor Truck Committee of the National Automobile Chamber of Commerce, reviews the progress of motor trucks in industry.

He shows how trucks have taken over much of the nation's haulage, have developed new businesses and opened up new territories, as well as increasing the scope of businesses already established.

He also shows how the trucks themselves have developed with the businesses, improving the methods by which goods are handled and loaded and so increasing the profits and general efficiency.

Here, in this article, are many of your arguments on which to base selling motor truck haulage.

## Salesmanship Requires Vision!



the trucks now make two to four complete daily trips with demountable bodies as against but one or two with fixed bodies.

A few months ago it was my privilege to be the guest of T. Eaton & Company of Toronto, which is the biggest retail dry goods house in Canada and which operates one of the largest mail order businesses in the world. I learned among other things on the inspection trip of the company's delivery service that motor trucks were being used to a great extent. To insure quick delivery of its customers' purchases a conveyor system is employed; this makes possible the delivery of all goods at the dispatching platform. Here the goods are placed into two divisions, depending on whether they are destined for local delivery or for distant points. In the case of the latter shipments a system of door-to-door delivery has been perfected with the railroads whereby the company's trucks haul the goods direct to the railroad siding and perform similar service

at other terminal points. Statements showed that motor trucks only took ten minutes to negotiate the first mile in comparison with the twenty-five minutes necessary for the horse and team. The average load of the truck was 9,000 pounds; while the team averaged only 7,000 pounds. The trucks further averaged six and one-half loads per day as against only four loads with horse-drawn units.

Shippers in general agree that the next great development in transportation in this country will be a national delivery service of this character for picking up traffic at the point of origin and making delivery at the store-door of the consignee at the point of destination. The motor truck offers the main solution of this problem in the opinion of many of the railway officials, as evidenced in the decision of the New York Central Lines to adopt the motor truck for relaying its large shipments to its consignees from the new railway container car, which has recently been put into service between Chicago and New York.

## Trucks Extend Service

Crowley, Milner & Company, of Detroit, was among the first to see the advantage of an extension of its delivery service to suburban points around Detroit as fast as improved roads made highway transportation feasible. This foresight enabled the company to build up a large and substantial business in the suburban field and a large fleet of trucks is now employed exclusively in this work.

At the inception of this operation plan the routes were extended no further than 15 miles from Detroit. Now practically all routes cover a round trip mileage of approximately 70 miles. Naturally, each new route proves a losing venture up to the time when people living along it begin to appreciate the shopping service that is being placed at their disposal. Then business begins to mend rapidly and within a short time the route shows a profit.

## Novel Cost Keeping System

A novel method of charging motor truck delivery costs to the various divisions of a department store has been worked out rather efficiently by Block and Kuhl Company of Peoria, Illinois. After a series of investigations the company decided to adopt the plan of charging the various departments with a cost of their deliveries. The cost of delivery of a standard package is determined monthly by dividing the total cost of delivery by the number of packages delivered in that month. The total delivery cost includes the sorting of the packages from the time they reach the shipping room until they are placed in the route bins and eventually delivered to the customer. The delivery cost, however, does not include a charge for package wrapping or for transferring the wrapped packages from the wrapping desk on each floor to the shipping room.



## Some Important Hints on

# Fitting Bearings Too Tight

*To Avoid Noise, Bearings Are Often Fitted So Tightly That Serious Damage Is Caused*

**T**HE problem of correct tolerance and clearances has generally been considered one for the engineering departments of the factories to study out and worry over and the service man has given little attention to it. The truck owners demand quiet mechanism and the least tap or noise is not always accepted as satisfactory.

There is a tendency therefore for the service man to work parts just as close as they will run to get this quietness and in doing so he may disregard entirely the tolerances that the factory engineers have worked out and he may also fit bearings so close that they are on the verge of the seizing point when the least amount of heating or introduction of a different grade of oil may shoot the bearings.

Many scored pistons and cylinders are the result of the effort of the service man to entirely eliminate piston slap and gear grinds in the rear axle are often the result of trying to get the ring gear and pinion meshed to remove all backlash. The result of these close fits is that the slightest amount of heat over the normal causes trouble.

Another important cause of trouble is the amount of endplay allowed in the crankshaft. Too much causes a knock and too little causes binding, excessive wear on the ends of the babbitt bearings and often the burning out of the bearing or at least a badly scored bearing.

### Bearing Fits

The proper tolerance in fitting bearings cannot very well be worked out by rule. The normal temperature at which the engine operates, the materials, design of the parts, etc., all have a good deal to do with the proper tolerance. Truck factories have in many cases worked out the correct tolerances and these can generally be secured from the engineering departments. The system of oiling also has a good deal to do with the right fits. In a pressure oiling system if the tolerance is too great, it is certain that too great an amount of oil will be forced out at the ends of the bearing and this of course leads to an oversupply of oil on the piston walls, leakage past the rings and a quick carbonizing engine.

Some of the mysteries of carbonization, oil pumping and scored pistons and cylinders are attributable to loose bearings when the lubrication is by a pres-

sure system. Other types of lubrication systems permit of a larger clearance without any bad results other than a noisier engine. The lubrication system, the pressure used on the lubricant and the amount of lubricant which is normally supposed to flow to the bearings, all have something to do with the bearing tolerance. A thermosiphon system of water circulation generally allows the engine to operate at a higher temperature than a pump system, although those pump systems that are fitted with thermostats sometimes equal the temperature of the thermal systems. The bearings in such engines must of neces-

in., while on a longer shaft the clearance should be as much as .015 or .018 in. The amount of clearance on each bearing is also different. If it is desired to position the crankshaft at the center bearing, the clearance can be quite small at this bearing, the clearances on the end bearings being very much larger. This will allow the shaft to expand outward from the center on each side. The Ford engine which has the magneto in the flywheel demands a certain definite clearance between the poles of the magnets and the cores of the spools and therefore it is desirable that the shaft be positioned at the rear main bearing and that the center and front end bearings have sufficient clearance to allow the shaft to expand forward.

The connecting rod bearings need end clearance too in order that the endways expansion may be taken care of. Assuming that the connecting rods had been perfectly lined up so that the main bearings were exactly at right angles with the cylinder walls, then the forward or backward movement of the crankpin due to endways expansion of the crankshaft would throw the alignment out, which would result in all the ordinary ills of this defect. Where the crankshaft is positioned at the center bearing, the two connecting rod bearings nearest the center can have a smaller amount of clearance than those further away from the center. The difference is small, to be sure, but attention to these small details is what results in good running jobs.

### Data the Buyer Wants!

It will all be found in the big issue of THE COMMERCIAL VEHICLE to be published January first, 1922.

This issue will contain specifications of motor trucks in the way the buyer can best use them.

Moreover, the big issue will include a comprehensive review of motor trucking, its growth and development, its field and its future, on a broad scale.

This big issue should be on your desk the year round, for reference.

### You Can't Afford to Miss It!

sity have greater clearances than those of the cooler operating engines because the heat will be transmitted to the bearings and as the degree will be greater the expansion will be greater and the liability to seizing will therefore be greater.

### Bearing Endplay

The endplay of crankshaft bearings is not given the attention that it should have. The amount of endplay depends not only on the temperature which the engine is supposed to maintain, but also on the length and design of the crankshaft. The linear expansion of the crankshaft has to be taken into consideration so that the longer the shaft is, the greater the clearance will have to be. On a short shaft on a four cylinder engine, the endplay can be as small as .009

### Wristpin Bushing Clearance

The clearance at the wristpin bushing must be very much greater per inch of diameter than in the case of the big end bearings because it has to operate at a much greater heat and also has a much less efficient means of lubrication.

One of the most frequent causes of bearing knocks in a newly overhauled job is a loose babbitt in either the crankcase or connecting rod. The reason is that the crankshaft is scraped or otherwise fitted to the bearing which may have raised several thousandths from its own seat. When the bolts are tightened down, the bearing goes back into place and destroys not only the fit of the individual bearing but also the alignment of the shaft. For this reason, when scraping the lower halves of the bearings, some method should be used to hold down the babbitt or die case bearings to their seats. It is possible to get



a much better fit by bolting the caps tightly in place and line reaming the bearings. This may show on a trial with Prussian blue, after the caps are removed, that one of the bearings is high and out of line, but it will be found that the babbitt or die casting has merely risen a little.

### Piston Fits

Of equal importance with the fitting of the main bearings is the fitting of pistons to the cylinders. Again the amount of heat has a good deal to do with the proper clearance and in addition to this, the diameter of the piston or bore of the cylinder and the structural design of the piston have a lot to do with it. Speaking generally the head of the piston or "lands" between the piston ring grooves need more clearance than the skirt. The

head of the piston gets hotter than the lower part which is cooled by oil and by radiation and the more solid structure of the upper part prevents the rapid dissipation of heat. Some designers even go so far as to step the clearance down from the top land which has the greatest clearance to the skirt which has the least.

Piston rings must have clearance at the joint to allow for expansion and also on the sides. If the ring fits the groove too tightly, it will bind under the heat of running and not only become useless as a piston ring, but may be likely to cause damage to the cylinder by scoring or rapid wear.

### Fits on Other Chassis Parts

As we get away from the engine, we get away from heat and therefore do not have to consider it to such an ex-

tent. There will be a small amount of heat, even in the rear axle, but not enough to have to make allowances for. The proper meshing of the pinion to the ring gear is taken care of through the endways adjustment of the pinion shaft and the endways motion or adjustment of the axle drive shafts. One adjustment meshes the teeth deeper or shallower and the other positions the pinion to correctly cover the teeth of the ring gear. The clearance is generally tested out with a piece of thin paper which should pass between the teeth without cutting. There are also other clearances to be taken care of, but they are not so minute as the bearing clearances. Anti-friction bearing adjustments are more generally understood and more nearly always correctly made than the clearances previously mentioned.

## Cutting the H. C. of Washing!

### *London Company Washes Its Buses by Machinery*

WITH the aid of the machine illustrated below, the London General Omnibus Co., with a fleet of 3000 buses, washes the vehicles at the rate of one every 2 min., eliminates hand washing and saves 75 per cent of the former cost of washing. The buses are first dusted off and then run between two ranges of four fixed iron standards, 4 ft. apart, with a space of 12 ft. 10 in. between the rows. There are two 1-in. brass sprinkler pipes, worked by levers. Pulling down the lever sprays the buses and releasing it automatically shuts off the water, by means of a plug valve and counterweights.

One range of standards carries a 1-in. brass sprinkler pipe on arms. This is

lowered to wash off the tops of the buses. When released, this sparge pipe flies back and shuts off the water. The hose connections are made with armored hose. All but the sparge pipes are of welded iron. The main supply to each machine is 2 in. and to the branches 1½ in. The most efficient and economical pressure is 50 lbs. per sq. in. There is also a rubber hose branch pipe for washing windows and filling the radiator.

The raised concrete platforms are 24 ft. long, 5 ft. wide and 6 in. high, with a 7 ft. space between. The edges are protected by 6-in. steel rims. In the center of each platform is an 18-in. wide hollow channel to contain water for the washers. They are filled by the drain-

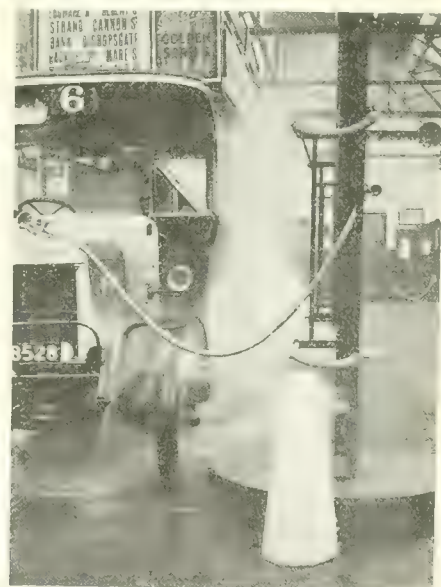
age from the pipes when these fall back into position. There is also a smaller sink in the pavement in front of each machine. The water in this is used for washing the front axles.

The water drains into big pits which are cleared out periodically with a vacuum cleaning outfit. A 4-in. drain outlet near the top of each pit takes off the surplus water into the main drains. These pits are partially roofed over with concrete, leaving a 7 ft. by 2 ft. opening which is covered by a triple-section movable grating of cast iron.

The water supply from the main and also each branch service is controlled by a stop cock. Only two men are needed to operate the machines.



The installation by means of which the London General Omnibus Co. cleans its buses with a water spray which saves 75 per cent of the cost of the old method of cleaning these buses by hand. Note the arrangement of runways for the buses and the neatness and cleanliness of the whole installation as well as the excellent lighting facilities



In this view the washing installation is shown while cleaning one of the buses. The radiator is being filled with water at the same time. No labor is required

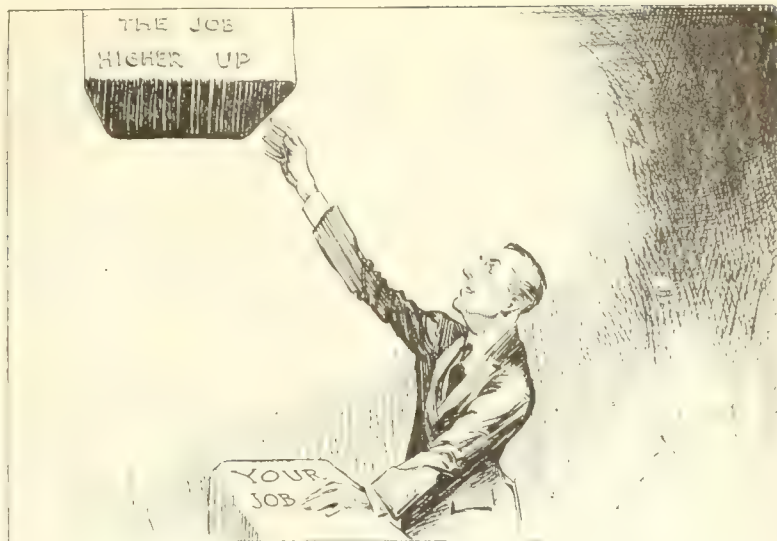






# And the Job Higher Up?

By  
*Sinclair Gluck*



BARRON stepped into the president's office, racking his brains to find what he had done or left undone, which would account for the old man's peremptory call for him. Barron knew that the president of the big commercial house was called Old Hammerhead by the men. He had had a talk with the old man and had seen the point of the name. But he did not know that the name, like most nick-names, held as much genuine affection as criticism in it. So he faced the coming interview with a good deal of uneasiness.

But Old Hammerhead was merely busy. He swung round in his chair as the young fellow came in. "Hello, Barron. Glad to see you. I've got an order here that I wanted to ask a question about and Ross is still sick, I believe, so I want you to tell me." And he handed the order to the young assistant superintendent.

Barron looked it over. It was an order for ten bars of bearing metal which he had put through at the request of the stock room clerk the day before.

"What is it you want to know about it, sir?" he inquired.

Old Hammerhead glanced up at him. "Why, Barron, it seems to me that that is a pretty expensive order. Are you sure that this is just the amount that we need at this time? Did you look into that?"

Barron stared at him, blankly. "Why, I'm afraid I—I didn't, sir."

"No? Well, then there is the question of whether this particular kind is the best thing to buy. I believe that there are a lot of other products on the market which it is claimed are just as good and a lot cheaper. Did you look into that question, before you ordered this?"

"No, sir, I didn't. The stock clerk said—"

Old Hammerhead interrupted him. "Well, suppose you look up the books and catalogs that Ross has down there, have a talk with the stock clerk and with one or two of the head mechanics and come back and tell me what you find. It seems to me we can save a little money on that order, either by holding up on most of it and only ordering a

little at this time, or by buying some other, cheaper product. Will you do that?"

Barron went away and was gone an hour or so. When he came back, he and Old Hammerhead talked it over and then made out the new order together. When it was finished Old Hammerhead leaned back and looked at the younger man.

"Barron," he said, "I understand that truck number three had a slight mishap yesterday. Is that right?"

"Yes, it broke a spring. But it's all right now and out on the road again."

"Broke a spring, or just a leaf?"

"I think he broke two or three leaves, sir?"

"How did it happen, Barron? Overloading, over-speeding or what was it?"

The young fellow looked around the room quickly, in search of inspiration. "Why, I think he probably overloaded his truck, sir."

"Don't you know, Barron?"

"Why, no, I don't. I turned the truck over to one of the head mechanics to be fixed up and it's out on the road again now."

Old Hammerhead shook his head slowly. "Barron, you're missing your opportunities. Why, man, there isn't a single one of the questions I've asked you since you came into my office that you should not be able to answer. And so far you haven't answered any of them."

Perspiration started out on the brow of the young assistant superintendent and Old Hammerhead looked up and saw it. He smiled suddenly. "Sit down, young fellow," he said, "and let's have a talk."

Barron sat down like a man sitting in the electric chair.

"I know you're busy," the old man began at once, "and I don't want you to take what I said just now in the form of criticism. I trust my employees and I know that you're giving me the best work you can. It isn't myself that I'm thinking about. It's you."

The old man laughed suddenly. "How many hands have you got, Barron?"

"Two, sir," answered the startled young fellow.

"Well, so have most of us. And I

think that a man, unless he has reached to the very pinnacle of his ambition, should use one of his hands to hold down the job he has and use the other to reach for the job that's just above the one he has." The old man paused. "And if he has reached the pinnacle of his ambition, he should scratch round and find another ambition that's higher yet. Otherwise, he'll die of inanition, Barron."

Old Hammerhead leaned back in his chair, smiling his genial smile. "You see, Barron, here you are in the position of assistant superintendent. That's a definite, important position and I have no doubt that you are filling it ably, because otherwise I don't suppose Ross would keep you at it."

"But it's more than a position. In a sense you are understudying Ross. You are his assistant, but you are also logically the next man in line for his job. Now, Barron, Ross could have answered any of those questions I asked you just now. But you weren't quite perfect in his part, were you?"

"No, sir, I really haven't had a chance to—"

"Perhaps not, perhaps not," the old man interrupted. "But if I were in your place I would have made myself the chance anyway. There are all kinds of ways in which you ought to prepare yourself for his job. You ought to be studying up on purchasing methods. You ought to have at least a bowing acquaintance with most of the truck accessories on the market. You ought to know these things to save the firm money in just such an instance as the one we have just discussed. You ought to learn all you can about repair methods. And, above all, you ought to know what is going on among the men under you. You should have made it a point to find out, not only what the accident was to truck number three but also how it happened, so that you can guard against such a thing in the future. That is the only way in which you can really understudy Ross. Don't you think so?"

"Yes, sir, I guess you're right—"

"Ross may move up a notch any day, Barron. Who's going to replace him—you or a man from the outside? That's what you must think about!"

# Cost Accounting Promotion

## An Interesting Discussion on Cost Accounting and How Far Trade Associations Can Go in Applying Their Influence to Promote Cost Keeping

UNIFORM COST accounting by trade associations is not only legal but highly beneficial. This is the personal view of Nelson B. Gaskill, acting chairman of the Federal Trade Commission, as expressed, unofficially, to E. W. McCullough, manager of the Fabricated Production Department of the Chamber of Commerce of the United States. The Commission heartily favors such work, "provided it is done scientifically and accurately."

Only when cost accounting is used for "ulterior purposes," such as finding averages or otherwise being made the basis of price-fixing, is it illegal.

Trade association members have long realized the importance of cost accounting information, and some of them have attempted to deal with the problem from an educational standpoint; but apparently not all of them have restricted their activities to the educational angle, and so have aroused criticism by the Federal Trade Commission and the Department of Justice. This has checked the efforts of others who were innocent of wrongdoing. It was to clarify the situation that Mr. McCullough wrote recently to Mr. Gaskill, asking for his opinion regarding uniform cost accounting as used by the producers of a certain line whereby they figured their cost under the same rules, including in them the same elements, and differing only in results because of variance in the size of plants, equipment, efficiency and local conditions. Such a standard plan would be uniform as to fundamentals.

### The Commission's Attitude

In reply Mr. Gaskill said: "There has been much misunderstanding and unfortunately not a little misrepresentation of the attitude of this Commission on the subject of uniform methods of cost accounting. In fact it seems to be difficult to secure, even for the most carefully worded statement, a proper appreciation of the Commission's position, yet it is really very simple, namely, that it is strongly in favor of such work provided it is done scientifically and accurately and is not used for ulterior purposes in violation of the law.

"No governmental agency in this country, except possibly the Treasury Department, has had so much occasion to observe the existing defects in cost accounting methods, but the Commission is glad to record its opinion that there

has been, on the whole, a considerable improvement in recent years. The work of this Commission would be greatly facilitated by further improvement in cost accounting methods and also, in fact, by a greater uniformity in methods provided proper methods are chosen as the models.

"There has been a good deal of indif-

ference and ignorance shown by individual companies regarding the methods of ascertaining cost. Accurate cost finding in some cases, however, appears to involve an expense that some business men regard as greater than the benefits, while in some industries the technical or theoretical difficulties in getting accurate costs are no doubt very great.

The Commercial Vehicle—Truck Cost System			
Month ending <u>July 31</u>		1921	
Make of truck <u>Service</u>		Gasoline <u>Electric</u>	
MONTHLY COST SUMMARY SHEETS U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline <u>46.5</u> gals.	28 gal	\$	130.06
Current _____ kw-h			
Oil <u>68</u> qts.	54 gal		9.18
Grease _____ lbs.			
Kerosene _____ gals.			
Waste _____ lbs.			
Dist. Water _____ gals.			
Driver <u>24</u> days	4.67 per day		112.08
Helper _____ days			
Mechanic _____ hrs.			
<b>A—Total Operating Charges</b>			<b>\$ 251.32</b>
<b>Maintenance Charges</b>			
*Tires <u>1440</u> miles	.0327	\$	54.29
{Repairs _____			23.62
{Overhauling, painting, etc.			
Spare vehicle rental _____			2.50
Garage rental (pro rata) _____			
<b>B Total maintenance charges</b>			<b>\$ 50.41</b>
<b>Fixed Charges</b>			
{Insurance, fire _____ per year		\$	13.48
{Liability _____ per year			
{Collision _____ per year			
Interest <u>7</u> (On Item 1—12)			28.46
{Depreciation on chassis _____			
{Depreciation on body _____			
{Depreciation on equipment _____			52.27
*Depreciation on tires _____			
Total taxes and licenses _____			11.40
<u>Administrative Overhead</u> _____			7.22
<b>C—Total fixed charges</b>			<b>\$ 112.83</b>
			<b>\$ 445.56</b>

\*Note: Omit one of these

Accurate cost keeping has always been advocated by THE COMMERCIAL VEHICLE. No attempt has been made to establish rates and averages, only to encourage accurate individual figures. Above is a sheet from THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks filled in. It is designed for the use of fleet owners and operators and is sold to them at cost



"As long as the principles of cost accounting are sound and the methods used are adapted to secure accuracy of individual results, and provided that the results are not used directly or indirectly for ulterior purposes of an illegal character, the Federal Trade Commission is in favor of the study and development of uniform cost accounting by trade associations, or otherwise.

"There is evidently nothing illegal in such a practice, but it is always well to remember that though innocent in itself, it has sometimes been perverted to serve the ends of collusive price control, and, when it is so used, no matter whether directly or indirectly, then restraint of trade is involved.

"With respect to uniform methods of determining conversion costs the same principles and conclusions would also apply."

In elaborating this statement, Mr. Gaskill wrote further a little later:

"Stated in another way, the conception of the Commission is that the efforts of a trade association to educate the individual member in the application of



Cost Keeping for All

The Standard Cost Keeping System for Motor Trucks, published by THE COMMERCIAL VEHICLE, has always been sold at cost price.

But now, in order to enable fleet owners new to the industry to install an accurate cost keeping system at the lowest possible cost, the price of the system has been still further reduced.

The entire system now sells for \$7.50, instead of \$12.50, as before.

This Is Your Chance!



sound principles of cost accounting in his individual business, are proper. But that any subsequent effort of the association to reduce the individual costs to an average or uniform cost basis and to procure the use of the group standard as a basis of price making by each of the individuals in the group, is improper. The individual must fix his own cost and his own margin. The group may not attempt to substitute a group average or standard either of cost or margin for the individual's figures without being in peril of becoming an unlawful combination.

"Applying this statement to your interpretation of our letter of the 25th, it may be said that for a trade association to set up and induce the use by its members of a scientific and accurate plan of cost accounting is not only legal but highly beneficial to the individual members of the association. The use of this legal and highly beneficial information by each individual in establishing his own production cost and determining his own margin, is entirely proper. If thereafter the association attempts to induce its members to disregard their own varying figures and use a common average or uniform figure of cost of margin or both, it has departed from its proper position of instructor and may easily take on the appearance of a price-fixing combination in restraint of trade or in suppression of competition.

"How far the association can lawfully go in acting as the medium of exchange of cost data among its members can only be determined after the decision by the United States Supreme Court in the pending action against the American Column and Lumber Company et al., in which this question is involved.

"In such an expression as this, nothing is 'condemned' by the Commission. The Commission renders judgment only after the trial of an issue of fact upon a complaint, after hearing. Such letters as this are advisory only, suggestions and nothing more, written in the hope that they may be helpful."

The "Cans" and "Can't's"

Commenting on this correspondence, Mr. McCullough says: "Believing that the chief function of a trade organization is the education of its members along proper lines, it is apparent that there is no bar, legal or otherwise, to their promoting cost accounting among their members within the restrictions mentioned in the correspondence. But I can not too strongly emphasize what is also pointed out as to using this valuable information in a way which is clearly unobjectionable."

The Fabricated Production Department of the Chamber of Commerce of the United States has made a great deal of progress in its efforts to develop uniform cost accounting within the various industries, and has accumulated information concerning about seventy such systems. Mr. McCullough urged that other trade lines not so supplied develop similar systems for the benefit of their members.

The Commercial Vehicle—Truck Cost System

Number of Truck

Capacity in lbs. 7000

Chassis No. 7599

MONTHLY SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243-249 WEST 19TH ST. NEW YORK

Investment

Cost of chassis, less tires	plus body and equipment	\$ 4 351 20
Cost of body		
Cost of equipment		
Cost of tires		527 80
1 Total cost, complete		\$ 4 879 00

Performance Record

2 Days operated		24
3 Days idle		6
4 Days maintained Item 2 Item 3		30
5 Total hours operated		
6 Total miles covered		1440
7 Total trips made		120
8 Total tons or packages or stops		6324

Performance Averages

9 Average miles per day maintained (Item 6—Item 4)	48
10 Average miles per day operated (Item 6—Item 2)	60
11 Average miles per trip (Item 6—Item 7)	12
12 Average tons, stops or packages per trip (Item 8—Item 7)	527
13 Average commercial ton miles, package miles or stop miles per trip (Item 11 x Item 12)	3162

Recapitulation

14 Total expenses for month (Sum of Items A, B and C)	\$ 144.56
15 Cost per day operated (Item 14—Item 2)	18.52
16 Cost per day maintained (Item 14—Item 4)	14.82
17 Cost per mile operated (Item 14—Item 6)	30.87
18 Total commercial ton miles, package miles or stop miles (Item 7 x Item 13)	3794.4
19 Cost per commercial ton-mile, package-mile or stop-mile (Item 14—Item 18)	172
20 Cost per ton handled	703

This is the recapitulation and performance record sheet of the Cost Keeping System. Only those facts are given which are of immediate use to the fleet owner in estimating his costs and in checking the record of the truck to determine if, and where, it has failed to keep up to standard efficiency. The cost per ton handled has been added for the use of commercial haulers generally

# The Better Way

*To Save Time in Truck Repair and Maintenance*

## No. 632—Easy Way to Make Coil Spring

A QUICK and easy way to make a coil spring is to place a breast drill in a vise and then put a rod (size according to spring to be made) together with the spring wire in the drill chuck. Next turn the drill with one hand and guide the wire with the other.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.

## No. 633—Removing Dodge Driveshaft Nuts

DODGE driveshaft adjusting nuts are removed, replaced and adjusted by placing the driveshaft in a large lathe with the front against the face plate and the rear against the tailstock. The housing is held with a large pipe wrench and the nut turned with a tool made from a piece of tubing.—C. R. PIERSON, Medina, N. Y.

## No. 634—Rear Axle Housing Lining

AFTER straightening a rear axle housing and testing in a lathe, this lining device will show if the housing is at right angle to the torsion tube or driving shaft.—F. A. PIERSON, New York City.

## No. 635—For Clutch Repair and Adjusting Brakes

A MEANS for holding the clutch pedal forward in making clutch repairs, and for holding the brake in the depressed position while adjusting and equalizing foot brakes, is afforded by the adjustable fixture shown in the accompanying sketch.

With this fixture practically both pedals of any truck can be held in the required position while the necessary repairs are being carried out.

The fixture consists of two parts of wood. One part, with a "V" groove at one end, bears against the pedal; the other part is rounded to bear against the front of the seat behind the pedals, and both have a series of holes into which pins are set to vary the length between the ends.

The fixture works as a toggle to obtain the desired pressure on the pedal, and the second pin is inserted to hold the fixture in position. This fixture can be made up in a comparatively short time and saves considerable delay in the repair.—F. TODD, Chicago.

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

## No. 636—Lapping in Cylinders

HERE is a simple and practical way of lapping in a cylinder when a mechanic finds himself without suitable manufactured tools, designed especially for this class of work.

Take a piece of  $\frac{1}{2}$  or  $\frac{5}{8}$ -in. round stock, 12 to 15 in. long. Flatten it out in the center. Next drill two holes in the flat part, placing them so that they cover the connecting rod holes. This permits the use of bolts for connecting the round stock to the connecting rod big end. After this has been done, the round stock may be used as shown in the accompanying sketch.—READER.

## No. 637—Tape for Slipping Fan Belts

CONSIDERABLE trouble is often experienced with flat fan belts that will not stay on. Especially on pulleys without flanges this trouble is the cause of much waste of time and energy.

It can be overcome entirely by wrapping some tape square in the center of the fan pulley. A belt will always run to the high side of the pulley or will

stay on if the pulley has enough tape to make a good crown.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.

## No. 638—Clevis Pin Puller That Is Handy

INACCESSIBILITY often renders the labor connected with the removal of a clevis pin somewhat difficult. After a mechanic crawls under the truck with a hammer and punch to knock out the pin, he finds very often that there is not enough room at the side of the pin in which to swing the hammer. The punch stands out so far that it is well nigh impossible to put the hammer into operation.

This work is simplified very much by the use of a piece of round stock. This is flattened out at one end and then notched so that it can be hammered or forced inside the clevis pin head. The cotter pin is then removed from the other end and the round stock placed at an angle that will permit the use of the hammer on it, as shown in the accompanying illustration.—H. MOONEY, Worcester, N. Y.

## How to Grind a Ball Check Valve

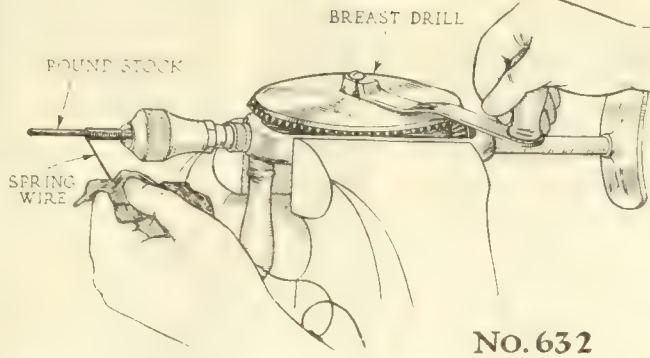
LEAKY ball checks of brass or bronze cannot be repaired by grinding like flat or bevel valves, but they can easily be made tight and as good as new by the following method:

First select a new bronze ball of the size required and throw away the old one. Obtain the diameter of the new ball with a micrometer, then select a steel ball exactly the same size, and place it on the valve seat. Take a piece of brass or steel rod that will pass in the chamber (or an old hammer handle cut down will answer), strike one or two sharp blows on the end of the rod or end grain of the wood with a hammer and the valve seat will be found true and round and tight when the bronze check ball is inserted.—E. C. GULETTE, Washington, D. C.

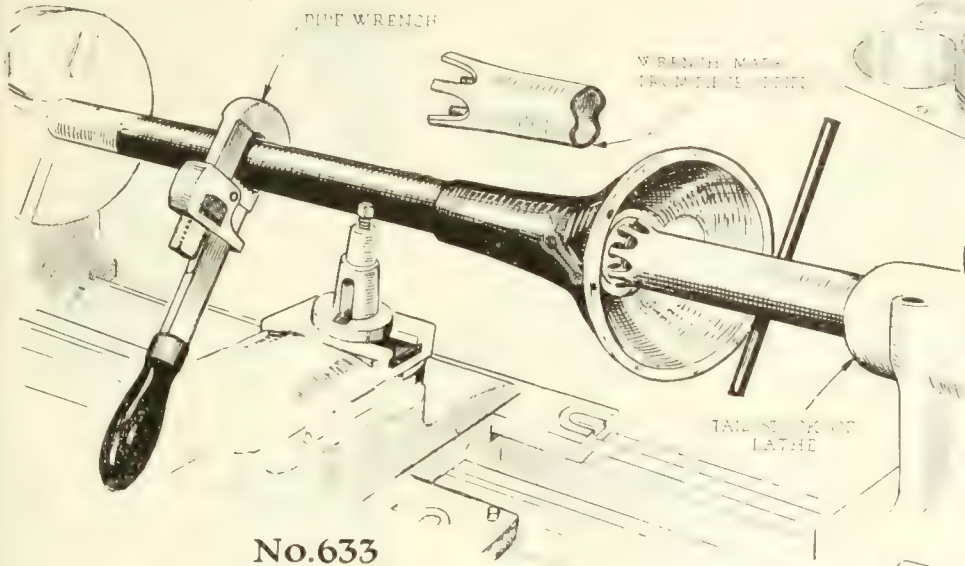
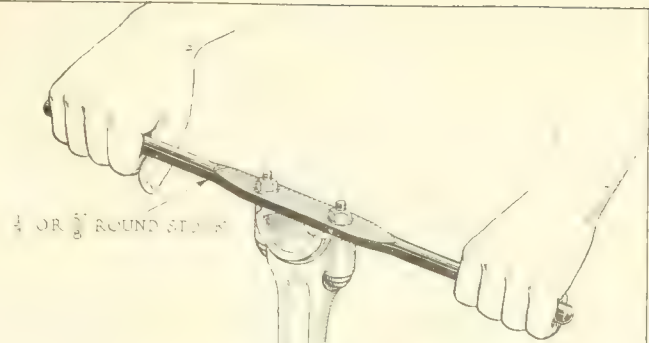
## New Armleder Truck

CINCINNATI, Nov. 25—The O. Armleder Co. is bringing out a new Model 30 with a capacity of  $1\frac{1}{2}$  tons. This will fit in the line between the present Model 20 and the Model HW. The engine is a Buda,  $3\frac{3}{4}$  by  $5\frac{1}{2}$  in., wheelbase 47 in., and final drive by Timken worm type axle.

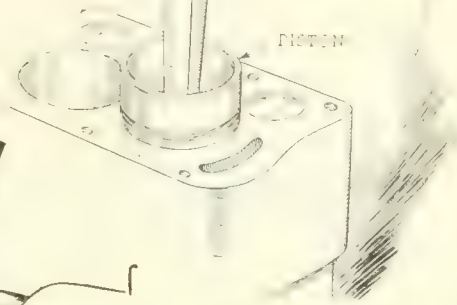




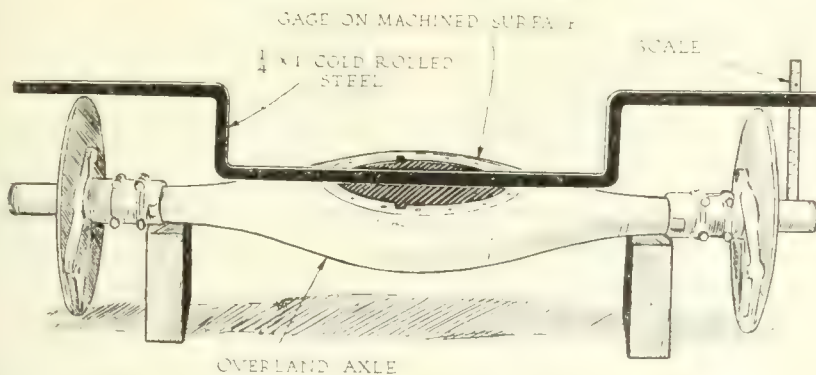
No.632



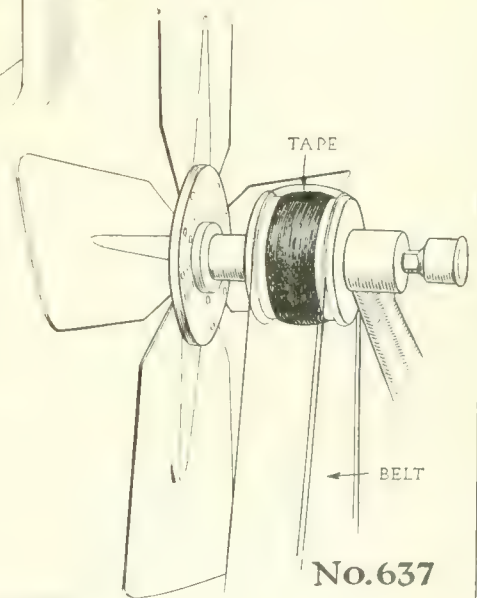
No.633



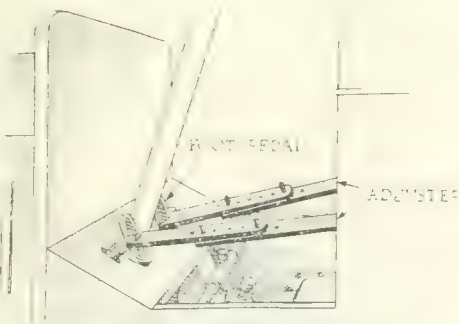
No.636



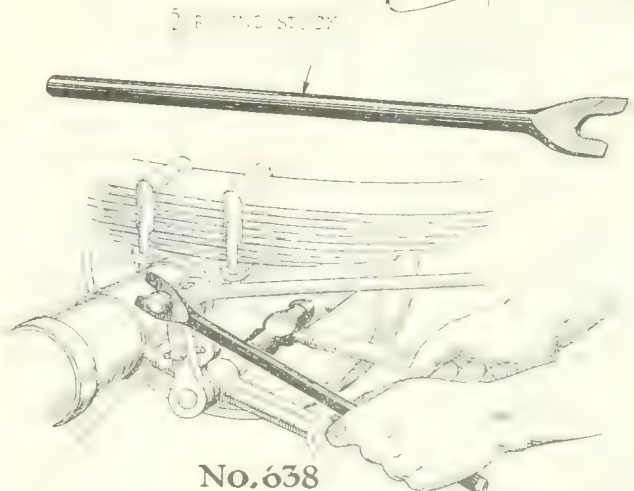
No.634



No.637



No.635



No.638

### No. 639—Eliminating Chattering in Reamer

A REAMER can be used without chattering by following the ideas brought out in the accompanying illustration. The socket wrench acts as a universal joint when the ratchet wrench is used for turning the reamer. In this way it is possible to get even pressure on all sides.—CHARLES BOEHME, Gobel's Garage, Brooklyn, N. Y.

### No. 640 — Wedging Battery Cells for Pouring Compound

TO align the cells, a long file is caught under the battery handles and wedged at each end while the compound is poured. Sometimes the tar composition material that is on top of the cells cracks, and very often these become serious points of leakage of the cell solution. The best and simplest way to remedy them is to seal them together with a hot iron such as an old cold chisel or similar tool. Press the hot iron on the side of the crack and gradually work them together until the hole is sealed over. If more of the tar material is needed, a big lump of it can be secured from a battery service station. To make a battery box acid proof, use six parts of wood tar and twelve parts resin, melt them together in an iron kettle, after which stir in eight parts of finely powdered brick dust. The surface to be covered must be thoroughly cleaned and dried before painting with this preparation, which should first be warmed.—A. M. BAYER, Modesto, Cal.

### No. 641—Inserting New Copper Tubing in Crankcase

NEW copper tubing is inserted in the crankcase by placing a piece of cold rolled steel in the copper tubing, tapering the end of the copper tubing slightly and tinning with solder. The other end of the steel rod can be driven in with a hammer.—JOHN GIBBS, Irvington, N. J.

### No. 642—Stock Racks for Shafts

BAR stock for shafts of various diameters can be conveniently stored on racks made from light angle iron, cut as shown in the attached drawing.

The advantage of this arrangement, apart from the cheapness and ruggedness of the racks, is that the stock can be marked for diameter with dimension on the wall at the back of the rack. The arrangement is compact and practically any long parts, such as axles, drive-shafts, pipes, springs, etc., can be stored advantageously on these racks.—W. GOODWIN, Chicago.

### No. 643—Getting Purchase of Bolts with Grease

THE insertion of bolts in inaccessible places around a truck often proves a stumbling block because it is impossible to use both hands. This is especially so when it is necessary to insert a bolt and

at the same time keep two holes in alignment, as shown in the accompanying illustration. In this particular case the use of a wrench or pliers is impossible.

This work can be materially made less difficult by placing a small quantity of grease (the heavier the better) on the end of the finger. The nut or bolt will readily stick and can then be put where it belongs.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Ia.

### No. 644—Front Wheel Bearing Lubricator for Fords

LUBRICATION of the bearings on Ford front wheels is easily accomplished by fitting the hub caps with cup attachments which will fit one of the patent chassis lubrication grease guns. The cup is soldered to the hub cap.—J. W. FERGUSON, Roanoke, Va.

### No. 645—An Improvised Bushing Puller

OCCASIONALLY a mechanic is forced to put new bushings in his axle and at that particular time is without a suitable bushing puller. A number of ideas along this line have been shown in the Short Cut pages and all have proved meritorious. The one shown in the ac-

#### Stop and Read This!

THE annual motor truck and trailer specification issue which will be published by the COMMERCIAL VEHICLE Jan. 1, 1922, will contain everything of interest to the fleet owner who is in the market for new equipment.

There will also be a very important survey of the industry, the growth and development of trucks, and an analysis of the future in truck transportation.

companied illustration is simple and effective.

Use a bolt and washer that will slide through the opening for the bushing, that is the outside diameter of the bushing, and then put a larger collar underneath so that the bushing will slide through it. The next step consists in adding a plain washer and nut, and the improvised puller is completed. Just turn the nut and the bushing is automatically forced out. The bushings may be also inserted with this outfit.—J. A. REDDAN, St. Louis, Mo.

### No. 646—Lift Pump for Man Holes

THIS is an idea which may be worked out for rigging up a pump drive from the rear wheel of a truck. It has been designed primarily for use by the telephone companies in sewer and other work where a pump is used.

The outfit consists of a 1/4-in. thick plate which is bolted to the rim, as shown in the accompanying illustration. The rim bolts are used for attaching this plate, which is slotted to permit their insertion. A slotted extension to this plate permits the hooking up of one part of a series of links which form the driv-

ing part of the pump. To this link is attached through a ball joint another link. The latter works on the arm or link which is attached directly to the pump, as shown in the sketch.

The rotation of the wheel when the truck is jacked up on both rear wheels will give the necessary power to operate the pump.—THOS. J. BURNS, San Francisco, Cal.

### New Short Courses Offered

ANN ARBOR, MICH., Nov. 23—During the winter period of 1921-1922, the University of Michigan will offer the following courses for men engaged in the practice of highway transport. These courses will be given in periods of 2 weeks each. A man may take one course or a group of courses. For further information, write to A. H. Blanchard, University of Michigan, Ann Arbor, Mich.

Dec. 5 to 16, 1921

American and English Highway Transport Methods. Professor Blanchard.

Dec. 19 to 31, 1921

Highway Transport Legislation and Traffic Regulations. Professor Blanchard.

Jan. 2 to 13, 1922

The Relationship of Highway, Railway and Waterway Transport. Professor Riggs.

Jan. 16 to 27, 1922

Highway Transport Costs and Record Systems. Professor Smith.

Jan. 30 to Feb. 10, 1922

Mechanism, Operation and Maintenance of Motor Trucks, Tractors and Trailers. Professor Lee.

Highway Transport Management. Professor Smith.

Feb. 20 to March 3, 1922

Highway Transport Economics and Surveys. Professor Blanchard.

March 6 to 17, 1922

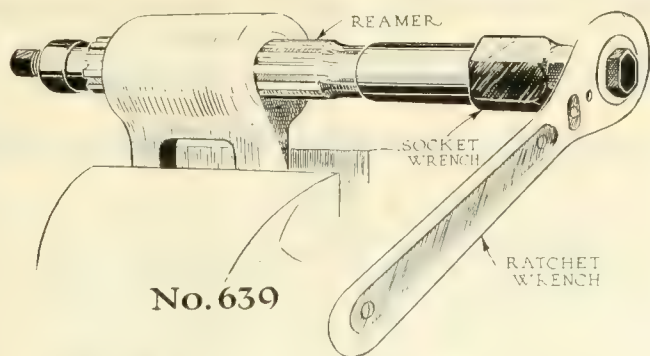
Highway Transport Summary. Professor Blanchard.

The entire membership of the organization will comprise the nineteen industrial organizations of the State which operate fully half the 40,000 trucks of Indiana. Many of the transport, transfer and warehousemen associations have been in existence for a considerable time, and together they have available for the school and the information bureau an immense amount of important data, statistics and records that assure its being highly practical. Funds for the motor transport terminal have already been pledged by leading shippers and other Indiana industries vitally interested in the advancement of highway transport in all its phases.

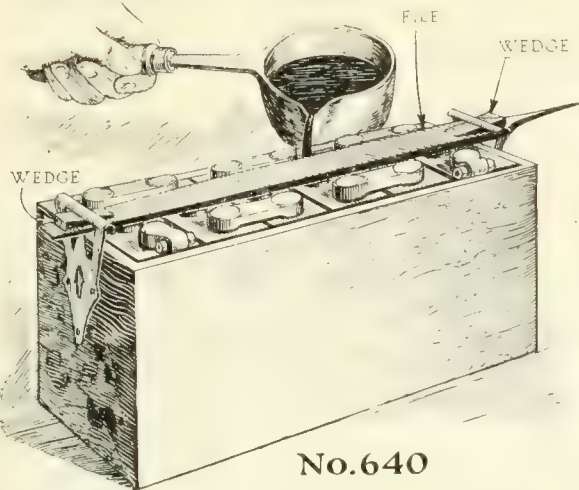
### No Competition Permitted

BLOOMINGTON, ILL., Nov. 15—The Argo, Illinois, Bus Line has lost its fight with the Chicago & Joliet Electric Railway Co., the Illinois Commerce Commission issuing an order restraining the bus line from operating in competition with the electric traction line, until a certificate of convenience and necessity has been granted. A similar complaint has been filed by the traction company against the Des Plaines Valley Bus Co., alleging ruinous competition and demanding that a certificate of convenience and necessity be procured before further operation is permitted.

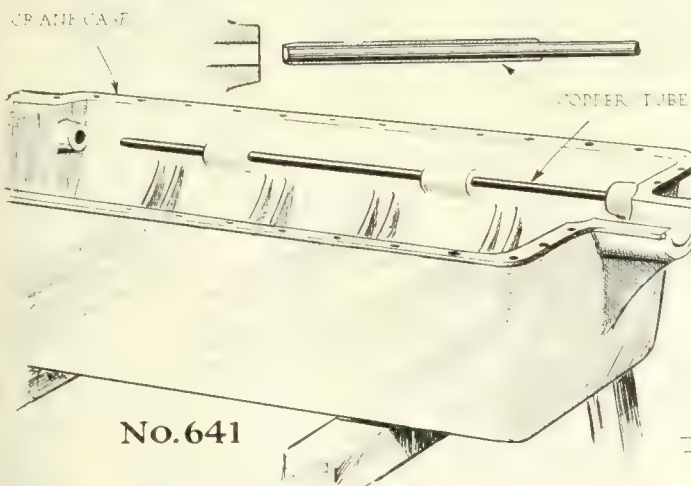




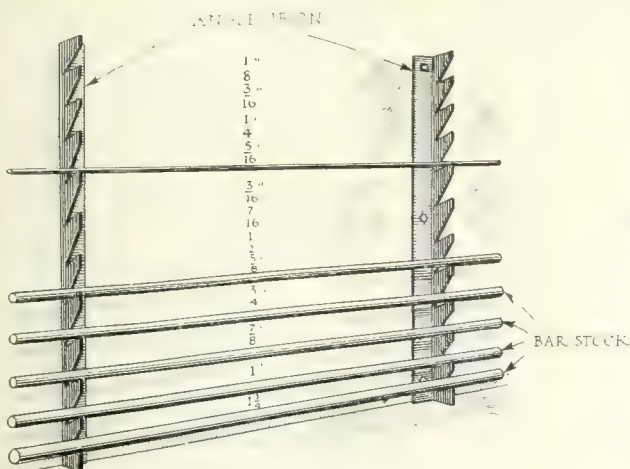
No. 639



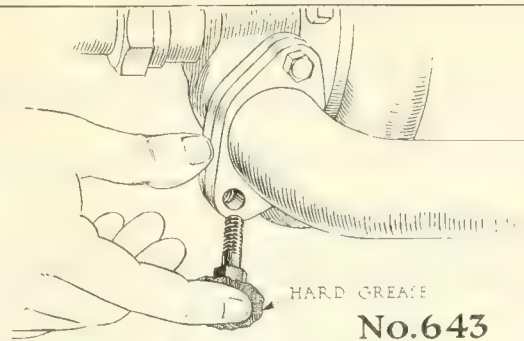
No. 640



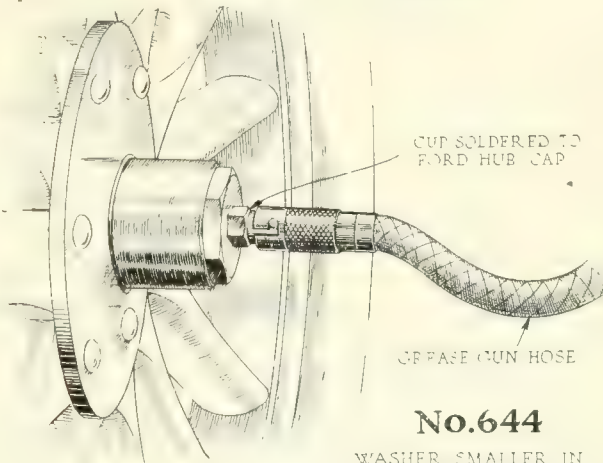
No. 641



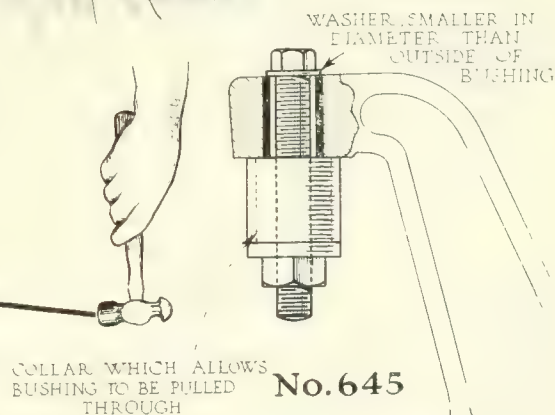
No. 642



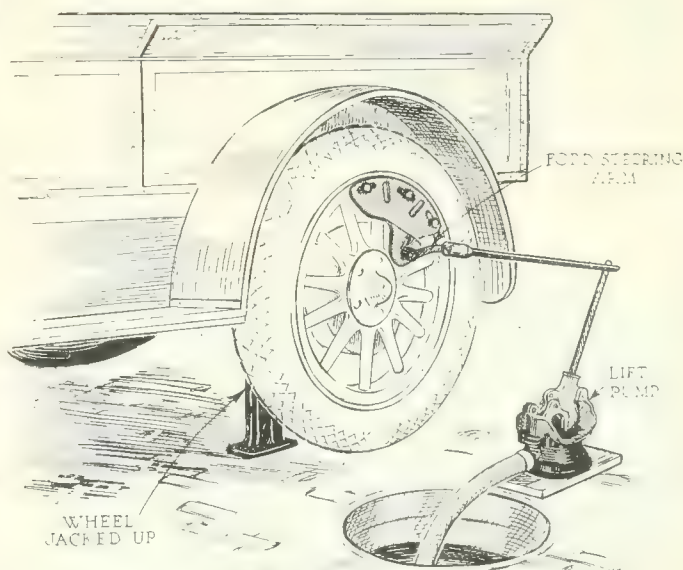
No. 643



No. 644



No. 645



No. 646

## Buyer's Department of The Commercial Vehicle

# Mack Rail Cars to Be Placed in Service on Branch Lines of N. Y., N. H. & H.

Three Already Ordered Will Be Constructed Largely of Components Used in Heavy Model AC Mack Trucks

### MACK SPECIFICATIONS

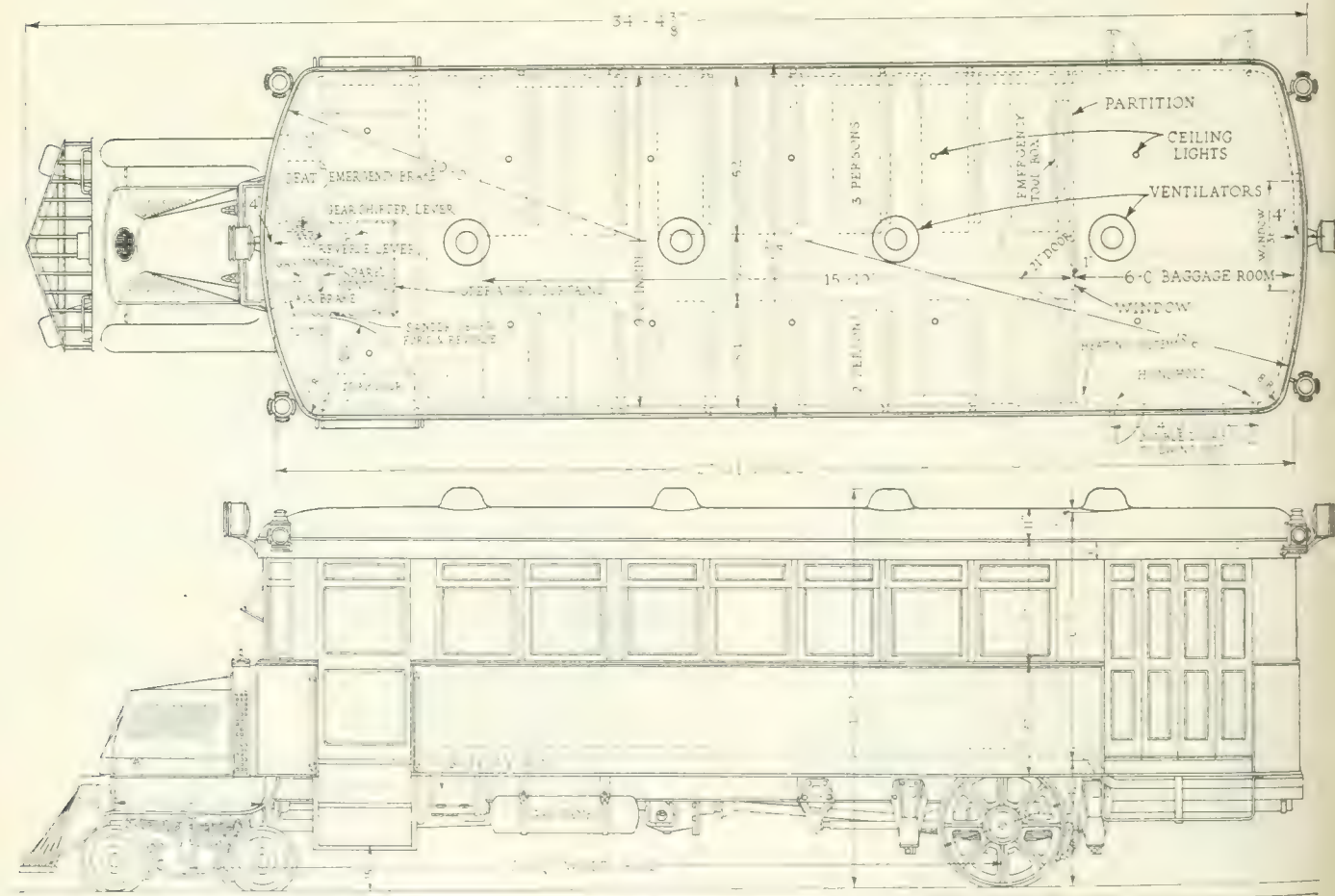
Wheelbase, ft. ....	22
Bore, in. ....	5
Stroke, in. ....	6
N. A. C. C. hp. ....	600
Speed, r.p.m. ....	1,250
Speed, m.p.h. ....	35
Gear ratio in high gear ....	4.53
Final drive.....	Bevel

SEVERAL Mack rail cars have been in operation on short line railways for a number of months, and are reported to have resulted in such material savings as to assure their early utilization by some of the great railways of the country chiefly for branch line service.

The New York, New Haven & Hartford Railroad has recently ordered three Mack rail cars and has announced that these will be put in service on their branch lines when delivered. These three cars will be constructed largely of components used in the heavy model AC Mack trucks. They will seat thirty-six passengers and will in addition have a baggage room, 6 by 9 ft., at the rear. Their speed, fully loaded on a level track, is 35 m.p.h. The engine and several other component parts are the same as are used in the AC truck. Special equip-

ment includes axles, wheels and a reverse gear which permits operation in either direction at about the same speed.

The rear axle is of special design since the large gear reductions obtained by the chain drive employed in the AC model truck is not required for railway work. The axle housing is of cast steel, and a single reduction bevel gear drive is employed. A simple flange to which the ring gear is bolted replaces the usual differential, which is not required, and drives the two live full-floating axle shafts through splined connections.



Side and elevation views of Mack rail car to be used on New York, New Haven & Hartford Railroad



## Buyer's Department of The Commercial Vehicle

The wheels are of cast steel, 40 in. in diameter, and have rolled steel locomotive tires shrunk on. They are mounted on the axles with large Timken bearings with considerable space between the inner and outer bearings of each set. The standard 56½-in. gage is employed. Special tubular radius rods, 5 ft. long, are used.

The standard four-speed AC gearset is used but without the usual reverse gear. However, the rear end is modified to take a propeller shaft connection instead of the jackshafts and bevel gears used on the chain driven truck. A reverse gearset identical with that used in the AB rail car is employed, but in this case it is mounted between the engine and the standard gearset. As in the smaller rail car, which is now in the hands of users, this gearset enables high speed operation in either direction and is controlled by a separate operating lever. When reverse drive is desired the direct driveshaft of the special gearset is divided and the power is transmitted to the layshaft and through a reverse gear back to the rear half of the main driveshaft as in a conventional gearset.

Rear wheel brake drums are not used. There are, however, brake shoes on the periphery of all six wheels. These are

arranged to be operated either by hand as an emergency, or by air pressure as in ordinary railway work. It has not yet been decided exactly how the air compressor will be driven, but it will probably be driven off the engine or the gearset.

A spark and throttle control column is used in place of the steering gear column which is not required.

Sanders, operated by a lever from the driver's seat and similar to those used on the smaller car, are employed. The exhaust gases are carried to the extreme rear end of the chassis frame. The pipe used is so long that no muffler is required.

Both sizes of rail car have provisions for exhaust heating. The exhaust can be bi-passed through guarded pipes extending along the inner body walls of the body near the floor.

Electric starters are provided for the engine in both sizes of car and both are fitted with miniature 12-volt train lighting systems driving from the engine and dynamo, consisting of a dynamo-lamp regulator, storage batteries, and ten dome lights.

A spark and throttle control column is used in place of the steering gear column, which is not required. Both en-

gines are fitted with high-tension magnetos with impulse starters. The engine in the AC car is the standard four-cylinder 5 by 6-in. type governed to a maximum speed of 1250 r.p.m.

The frame on the larger car has 5/16-in. chrome-nickel heat-treated side members, 31 ft. 10 in. long. In order to lower the frame the springs are hung under the rear axle and are attached to the frame by rubber shock-insulators in place of shackles. These insulators are used at both ends of both springs. They tend to improve the riding qualities and prevent the shock of passing over rail joints from reaching the frame of the vehicle. All springs are of the half-elliptic type.

The wheelbase measured from the center of the leading truck to the center of rear wheels is 22 ft., which is within the fixed wheelbase allowed on locomotives. This permits of the car being operated at moderate speeds on a curve of 40 ft. radius. The total track length of the car is 24 ft., hence a turntable of this diameter can be used to turn the car around.

The chassis weight is 13,675 lbs. The total weight with body, thirty-six passengers and 900 lbs. of baggage is estimated at 26,000 lbs.

## Commerce Brings Out "Store at Your Home" Model

### Designed for Grocery Trade

#### COMMERCE SPECIFICATIONS

Capacity, tons.....	1
Price, complete.....	\$2,250
Wheelbase, in.....	127
Tires, front.....	34 x 4½
Tires, rear.....	34 x 4½
Stroke, in.....	3¾
Stroke, in.....	5
A. C. C. hp.....	22.5
Speed, r.p.m.....	2200
Speed, m.p.h.....	40
Gear ratio in high gear.....	5.14 to 1
Final drive.....	Spiral Bevel

THE latest Commerce innovation, the "Store at Your Home" model, is a completely equipped grocery store built on the Model T chassis. The idea is not entirely new, having already been tried out by enterprising truck owners throughout the country who have realized the need of this type of body and have built a home-made proposition for that purpose.

The new Commerce creation is 72 in. high inside and allows plenty of room for a tall man to stand erect. The aisle is 30 in. wide and on each side there is a tier of four 8-in. shelves for stocking various commodities and a series of 5-in. bins for storing sugar, flour, potatoes, etc. In front of the body a refrigerator is installed making it possible for the owner to carry meats, butter

and other perishable goods. The body is 5 ft. 6 in. wide and 9 ft. 3 in. long. There is a rear door 26 in. wide. Two rear steps with railing are also part of the body equipment. Two electric dome lights and windows above the shelves give ample light. There is a comfortable seat for the driver with a clear vision, ventilating windshield and storm curtains. The refrigerator, installed as optional equipment, has a drain pipe

which extends through floor of truck.

This new Commerce model sells for \$2250. The specifications include a Continental four-cylinder engine, Long radiator, Eisemann magneto, Bimel wheels, Detroit pressed steel frame, Bijur starting and lighting with a Willard battery, Zenith carburetor, Detroit gear clutch and gearset, Salisbury front and rear axles, Detroit springs, Saginaw steering gear, and Spicer universal joints.

New Commerce  
"Store at Your  
Home" model a  
1-ton job





# Buyer's Department of The Commercial Vehicle

## Hoopes Wheel Has No Wooden Felloe

THIS wheel has been in process of development for the past 2½ yrs. The makers in designing it have retained the wooden spokes but have not included a wooden felloe. The inverted channel section takes the place of an S. A. E. band as well as the wooden felloe, and as the spoke has a complete bearing on the end grain on metal, the seating of the spoke shoulder has been greatly strengthened. In the 36 by 12-in. size, it is stated that the Hoopes wheel with the metal felloe weighs 25 to 30 per cent less than the wood felloe wheel. The maker is Hoopes Bros. & Darlington, Inc., West Chester, Pa.

## Duro Spark Plug

THE ease with which this plug may be cleaned is one of its features in design. The porcelain may be removed without taking the shell out of the block and there are no obstructions to perfect cleaning. The removing and replacing of the porcelain does not disturb the adjustment of the igniting spark gap. Another feature is the adjustable spark intensifier. This spark gap is incorporated in the porcelain which has the well known effect of greatly invigorating the spark. The gap is inside a glass protector tube. The price is \$1.50. The maker is the Duro Co., East Orange, N. J.

## Manex Heater for Fords

THIS heater consists of a combined air chamber and conduit around and above the exhaust manifold. Cold air is drawn in, heated by contact with the manifold and carried back into the car through an opening in the dash just above the level of the flow. A shutter is provided so that the heat can be turned off when it is not needed. The price is \$3. The maker is the Miller-West Co., Dayton, Ohio.

## Pierce Clutch Governor Prevents Grabbing

THIS governor is a dash pot about 2 in. in diameter and 6 in. long. The base is attached to a bracket (fastened either to the gearset case or to the frame) and has a pivotal action. The other end connects to an extension on the bottom of the clutch pedal. Inside the dash pot is a fluid on which changes in temperature have practically no effect.

As the clutch pedal is pressed down the piston inside the cylinder raises with no resistance since the fluid passes freely through the poppet valves in the piston head. When the pedal is released, the piston starts to travel downward and forces the fluid through a by-pass and

## Truck Accessories

offers just enough resistance so that the clutch engages without jerk. A passage of the fluid can be regulated to suit each type of clutch. The maker is the Pierce Governor Co., Anderson, Ind.

## Garrison Grease Cup

THIS cup screws into a standard thread. It is under constant pressure to the bearing, giving a positive feed and greasing the bearing while in motion. By an occasional turn of the cap, this pressure can be maintained at all times. A heavy leather washer fits over the hexagon base and is reinforced with a steel washer. The screw plate is provided with four holes through which the grease is forced into the base, and which prevents emptying the base when removing the cap. Prices vary from 20 to 40 cents per cup, according to size. The maker is the Garrison Co., 215 River Street, Bridgeport, Conn.

## Suspension Radiator Core for Ford Trucks

TO take out the Modine radiator suspension core requires the removal of only four bolts and two gaskets. The radiator is designed so as to permit fitting either the Modine tubular or spirex core. The frame consists of only three pieces. The core is equipped with a shallow, reinforced header tank and is drawn against the radiator upper tank by two cap screws. The maker is the Modine Radiator Co., Racine, Wis.

## Spotlight for Attachment Inside Truck Cabs

THE Perfector Raydeflector is an attachment which permits the spotlight to shine through the windshield of truck cabs. It attaches to the instrument board and a handle allows the driver to direct the rays wherever they are needed. A flexible hood pressed against the windshield glass eliminates the glare which would result from the light shining through the windshield, and still permits movement of the spotlight. It can be detached from the bracket and used as a trouble light. The maker is the Reiber-Kolz Mfg. Co., Adrian, Mich.

## Morand Demountable Cushion Wheel

THIS is interchangeable with and replaces any pneumatic truck tire without wheel change. It fits any standard S. A. E. pneumatic center. A cushion of live rubber is bolted top and bot-

tom between steel channels. In action, this cushion provides equal distribution of resiliency throughout the entire circumference of the wheel so that not one portion receives the entire burden. The makers claim that it is possible for a mechanic to apply a set of these wheels in less time than it takes to change a single pneumatic. He simply jacks up the truck, removes the pneumatic tire and rim, slips on the Morand demountable cushion element and solid tire, tightens the lugs and the work is done. The maker is the Morand Cushion Wheel Co., Chicago.

## Standard Governor for Fords

THIS is designed expressly for the Ford truck. The drive is taken from the camshaft and fits into the generator opening. It is stated that installation takes less than 1 hr.

This governor is so designed that the slightest variation in the load will cause it automatically to open or close as desired. The action of the governor is as follows: Weights H and H are expanded, moving sleeve I and ball cup J to the left, moving pendulum cam K and throttle rod L which connects with throttle lever D, closing as to speed best suited to the needs of the driver for the work then engaged in. Spring tension is set at factory for 1500 r.p.m. of engine. Should it be necessary to change this speed, provisions are made on tension stem F. The price is \$25. The maker is the Kokomo Brass Works, Kokomo, Ind.

## B. & D. Cushion Accelerator

THIS device has been developed to prevent fluttering of the throttle owing to bumpy roads with the consequent jerky motion of the foot. It consists of a large polished aluminum pedal which is hinged to the floor or toeboard and provided with an air cylinder which operates over a piston attached to the toeboard. The bottom of the pedal rests upon the standard accelerator with which the truck is equipped. When the pedal is pushed down the air in the cylinder is forced through a valve at the top and when the pedal is released the air is drawn back into the cylinder. The price is \$9.75. The maker is the Black & Decker Mfg. Co., Baltimore, Md.

## Hill's Illuminated Oil Gage

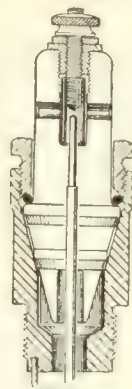
THIS gage is intended to replace the regular Ford gage. A wire running from the gage to the storage battery, or any other source of current, and connected to a switch on the dash, lights this gage and makes it an easy matter to ascertain the amount of oil in the crankcase. The maker is the G. L. Hills Co., Franklin, Ill. The price is \$2.50.



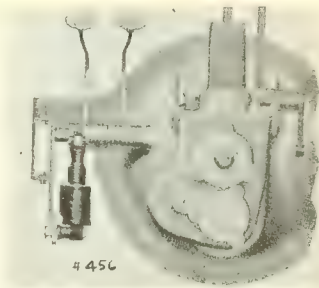
# Buyer's Department of The Commercial Vehicle



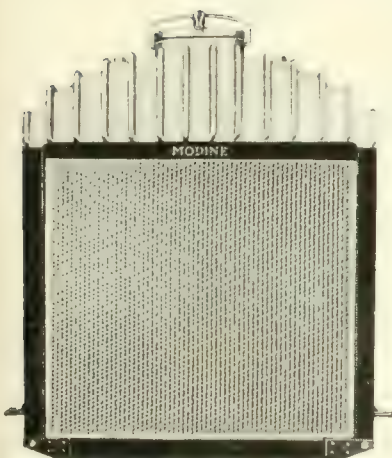
*Black & Decker cushion accelerator*



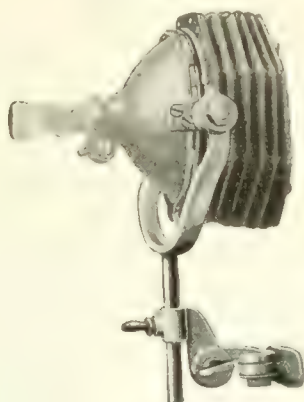
*Duro spark plug*



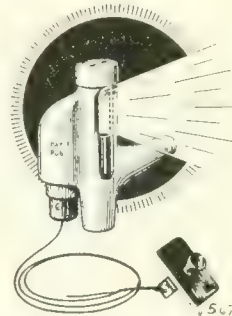
*Pierce clutch governor prevents grabbing and sudden engagement*



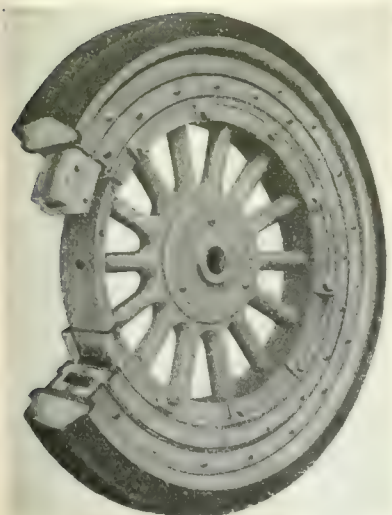
*Modine radiator for Ford trucks*



*Perfector Raydeflexor*



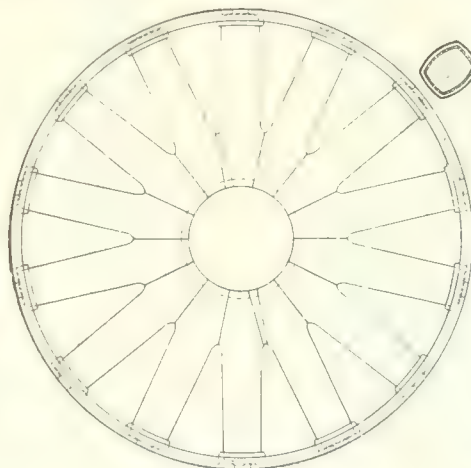
*Hill's illuminated oil gage for replacement on Fords*



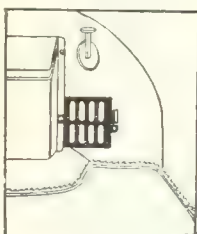
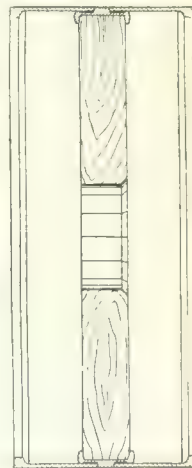
*Morand demountable cushion wheel*



*Garrison grease cup*



*Hoopes wheel*



*Standard governor for Ford trucks*

# Buyer's Department of The Commercial Vehicle

## B. & D. Grinder

THIS is known as an 8-in. electric bench grinder, having a  $\frac{3}{4}$ -hp. motor operating on alternating or direct current at will. The grinding wheels set well forward of the motor casing and are arranged so that they overhang the bench, making possible the grinding of long pieces and odd shapes. It is also possible to wear the grinding wheels down to the clamp washers, thus avoiding wastage of wheels. The motor is air-cooled and is arranged so that the cooling air intake is located 12 in. from the grinding wheels in order to reduce the possibility of grit being drawn into the machine. The outfit complete is priced at \$120. The maker is the Black & Decker Mfg. Co., Baltimore, Md.

## Wepplo Reboring Mill

THIS will rebores cylinders up to 14 in. in length and from  $2\frac{1}{4}$  in. to 6 in. in diameter. The device weighs 160 lbs., including the  $\frac{1}{4}$  hp. motor. Centering of the boring tool is facilitated by special entering disks. The spindle is driven at 25 r.p.m. for boring and at 100 r.p.m. for the polishing operation. The rate of speed of  $\frac{3}{4}$  in. per minute is maintained by the automatic feed screw. An emery wheel attachment with removable bracket is supplied for sharpening the cutting tools. The machine will rebores and polish the present day removable head type of blocks without their removal from the frame. The price, f.o.b. Chicago, is \$295. The special Wepplo micrometer enables the operator to instantly set the boring tool to the exact dimension desired. Its price is \$25. The maker is the Wepplo Machine & Tool Co., Chicago.

## Royal Valve Grinder

THIS valve grinder is of the oscillating type and is actuated by the up and down motion of a long handle. The valve spring furnished with the grinder raises the valve from its seat when the hand is lifted. Ball bearings in the bevel gear make it easy of operation. The maker is the Universal Equipment & Supply Co., Syracuse, N. Y.

## Rose Bushing Remover

THIS bushing remover has a steel drift split to give it tension. On the end are two small pivots which keep the remover in correct alignment on the bushing when it is used for drift bushings, where the casting itself does not serve as a guide. Particularly suitable for removing spindle bushings, tie rod bushings and spring perch bushings, it is made in two sizes, one for the Ford and one for the Dodge. The maker is the Frank Rose Mfg. Co., Hastings, Neb.

## Shop Equipment for Fleet Owners

### Triangle Valve Refacer

THE Triangle valve refacer possesses commendable features of design. Those worthy of note are: The three-edged cutter, range of adjustment from 25 to 90 deg., compact and rigid construction. The triangular cutter is adjustable to varying angles of valve face by the movement of two set screws. Valve stems are held securely in split sleeves, which are adjustable by means of the toggle bolt and wing nut. The feed screw is of  $\frac{1}{2}$ -in. diameter, and ball is countersunk in the end of this screw, which provides accurate and rigid centering of valve head. The price is \$12. The makers are L. H. Riggs & Son, 527 Milton Street, Cincinnati.

### B & D Safety Cleaning Machine

THIS consists of a cast iron pedestal with a bowl at the top, 13 in. in diameter and about 12 in. deep. About 5 in. from the bottom of the bowl a fine mesh brass screen is supported. A plunger pump is cast integral with the bowl at one side. The bowl is provided with a safety cover, arranged so that it cannot be left open. This cover is controlled by a convenient handle which operates the plunger pump when the cover is lifted.

A gallon of gasoline, kerosene or such liquid cleanser as is desired is merely poured into the bowl of the machine and the operation of the plunger pump forces a stream of this fluid from one side into the center of the bowl. It passes through the screen and returns to the sump so that the liquid is used over and over again. The maker is the Black & Decker Mfg. Co., Baltimore, Md. The price is \$56.

### Knorr Detachable Coupling

THIS is readily detachable, leakproof and is applicable to metal lined gasoline hose. In its standard form it is capable of withstanding pressures of over 450 lbs. per square inch of hose area. The distinctive features of the coupling are as follows: Three or more strong, light arms of stamped steel are made to closely embrace the end of a hose of any given size outside. These arms are held in place by a light steel ring. The steel arms are made to grip the hose by means of a wedge or spreader nut threaded on the shank of the coupling and forcing out the arms at the other end. In this way a compound leverage is brought into play, enabling the user to exert a

great and easily adjusted pressure on the hose and also enables him to quickly remove same by turning the wedge nut a few times. A leather gasket tightly wedged against the end of the hose protects the hose inside the coupling against possible failure. The maker is the Barlow Mfg. Co., 114 Park Place, New York City.

### Elm City Terminal Outfits

THIS outfit, which eliminates the soldering on of terminals, consists of 1000 brasslets and an 8-in. nickel-plated punch with knurled handles. In operation, the insulation of the wire is removed, the ignition cable split, and the wire twisted around the brasslet after which the punch is operated. The makers are C. S. Mersick & Co., New Haven, Conn.

### D. B. Welding Torch Outfit

THIS new garage and small machine shop welding torch and carrying case outfit sells for \$55. This oxy-acetylene equipment gives to the small shop the means for efficiently repairing broken steel, cast iron, aluminum, copper, brass and other metal parts. The outfit consists of one torch, three extension tubes, five welding tips, one oxygen regulator, 12 ft. acetylene hose with connections, one sparklighter, one pair of colored glasses, one torch wrench, and one regulator wrench. This assortment also includes a quantity of the various rods and fluxes necessary for the average welding job. The maker is the Davis-Bournonville Co., Jersey City, N. J.

### Adkins Grease Gun

THIS gun can be easily filled with the heaviest grease. The operating screw of the gun has a large square-cut thread which enables maximum pressure to be obtained with minimum ease. The buyer is given the choice of a flexible armored hose or the Adkins special rigid connections. The maker is the Adkins Sales & Mfg. Co., Canton, Ohio.

### Bierman Friction Clutch

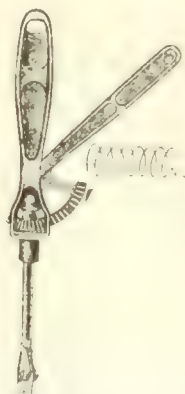
WITH this clutch it is possible for the operator of a gasoline engine, line shaft, or other machinery, to stop his machinery instantly without stopping the power. These clutches are designed to take the places of tight and loose pulleys. All parts are jig built and interchangeable. The clutch can be safely keyed on in. of extended shaft or more. It is claimed it will start the load without jerk or jar and can be used with either hand wheel or shifting lever for engaging and disengaging. Prices range from \$18.25 to \$52 according to size and type. The maker is the Strite Governor Pulley Co., Minneapolis, Minn.



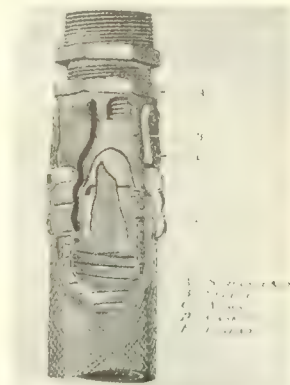
# Buyer's Department of The Commercial Vehicle



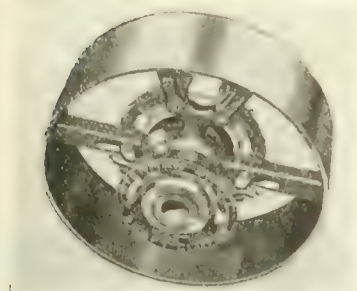
*B & D grinder*



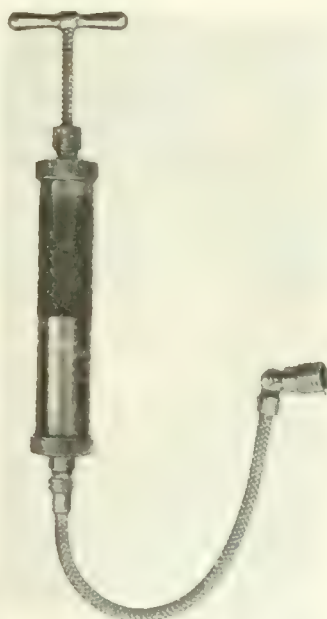
*Royal valve grinder*



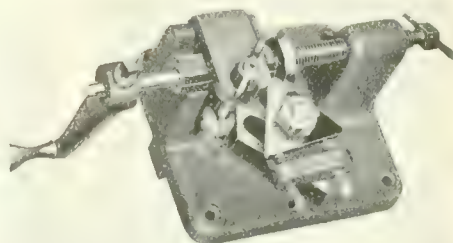
*Knorr detachable coupling*



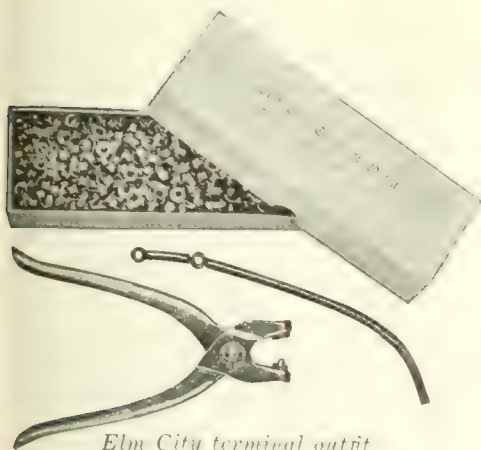
*Bierman shaft clutch*



*Adkins grease gun*



*Triangle valve refacer*



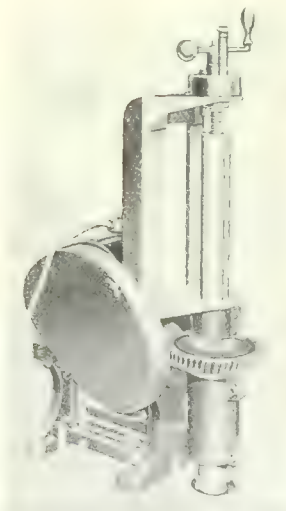
*Elm City terminal outfit*



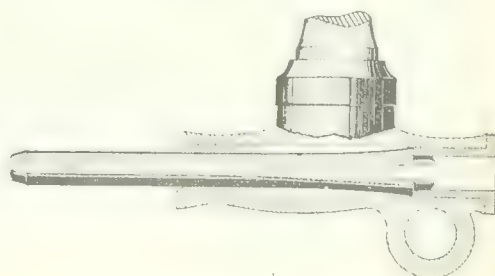
*D. B. welding torch outfit*



*B & D cleaning machine*



*Wepplo reboring mill*



*Rose bushing remover*

## Buyer's Department of The Commercial Vehicle

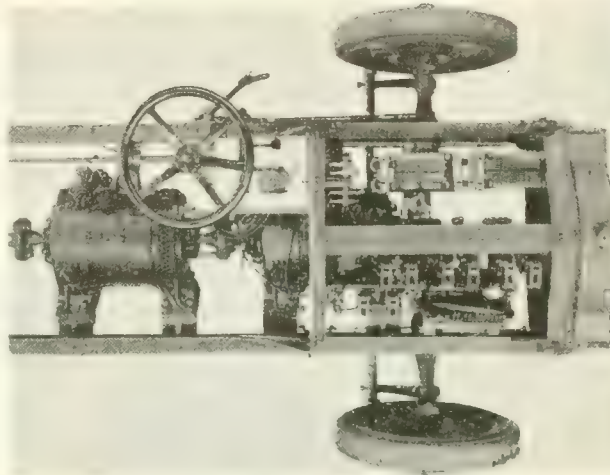
# Trolley Bus Mounted on Truck Chassis

**Packard Demonstrates Vehicle Using Electrical Equipment Furnished by Westinghouse—Two 25-Hp. Motors Mounted in Tandem for Propulsion**

THE Packard Motor Car Co., Detroit, has recently made several demonstrations with a trolley bus using electrical equipment furnished by the Westinghouse Electric & Mfg. Co. Contrary to the design of previous vehicles of this class, the Packard trolley bus follows gasoline bus design rather than street car design. The body is set comparatively low and is arranged to seat twenty-five passengers with considerable space available for standees.

The complete vehicle including trolleys with 18-ft. poles weighs 11,500 lb., of which weight 6770 lb. is carried on the rear axle. The chassis is of standard Packard type ED design with such omissions as are necessary to accommodate electrical instead of gasoline equipment.

The propulsion equipment consists of two 25 hp. Westinghouse ball-bearing trolley car motors mounted in tandem and coupled together and to the driveshaft with flexible couplings. This arrangement lends itself to the use of a low floor vehicle and yet provides accessibility to and the easy removal of equip-



*Front end of Packard trolley bus*

ment in case of necessity.

The torque of the motors is transmitted through the driveshaft to the worm-driven axle with a total gear reduction from the motor to the wheels of 7 $\frac{1}{4}$  to 1. Tubular radius rods remove driving strains from the springs.

The control equipment is of the foot-operated type and is arranged for auto-

matic acceleration. The notches are provided on the foot controller so that it is possible to arrest the controller at a slow or "switching" speed for travel in dense traffic or at the series or half-speed position. In this way the operator can give his entire attention to the driving of the vehicle and has both hands available for steering.

The front axle is drop-forged and has an "I" cross section. The steering knuckles are of the inverted yoke type. The rear axle is a built-up structure arranged so that the weight of the vehicle is carried on heavy steel tubes fastened to the housing. The worm, which is located directly above the worm-wheel, and the differential are mounted as a unit in a cast steel carrier bolted in place in the center housing of the axle. The axle driveshafts are arranged so that they transmit torque only and do not carry any of the direct load of the bus.

The service brake consists of two contracting shoes operating on a single drum at the rear of the transmission. The emergency brake consists of two sets of internal-expanding segments acting on steel drums on both of the rear wheels.

The wheels which are equipped with special rubber cushion tires are 34 in. in diameter, resulting in a free-running speed of the bus of approximately 22 m.p.h. with the gear reduction already mentioned.

The electric motors, it is stated, weigh approximately 175 lb. less than the gas propelled engine equipment for the same size chassis.

On account of variations in tractive effort required, a unique control operating scheme has been devised. The unusual grade and load conditions to be met may necessitate that some accelerations be made at double the normal accelerating tractive effort. A small motor driven sequence switch controls the operation from series to parallel while the speed of this small sequence switch motor is directly affected by current in the propulsion motors.

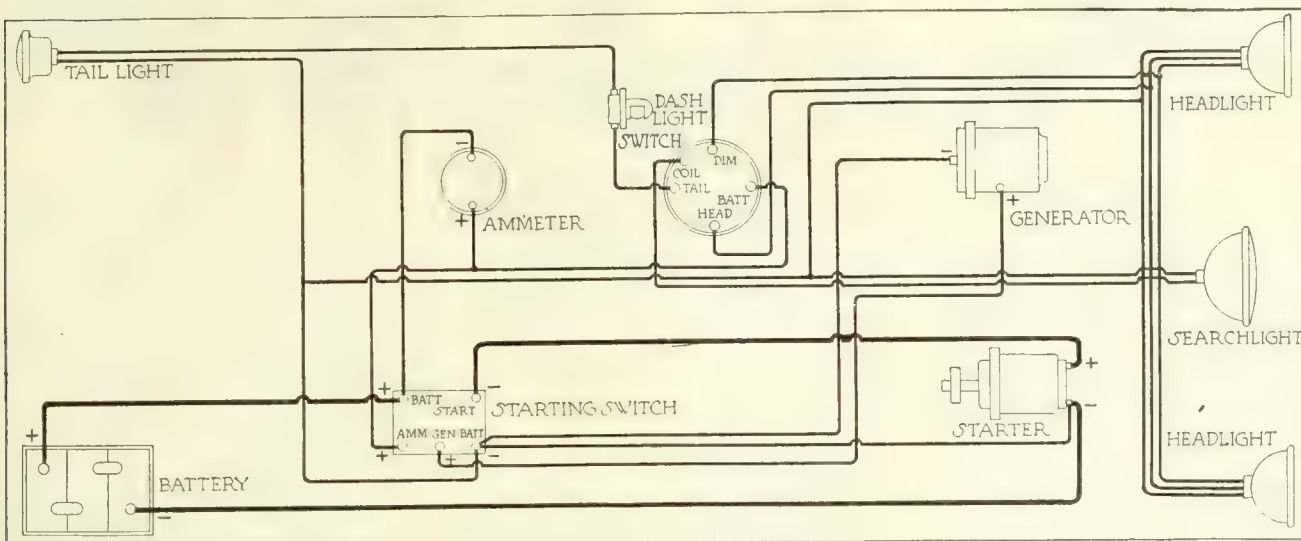


*The complete weight of bus is 11,100 lbs. Over half of this weight is on rear axle*



# Motor Truck Electric System Wiring Diagrams

## 46—Starting and Lighting Unit on Four Wheel Drive Truck



Starting and lighting system used on the Four Wheel Drive truck

### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

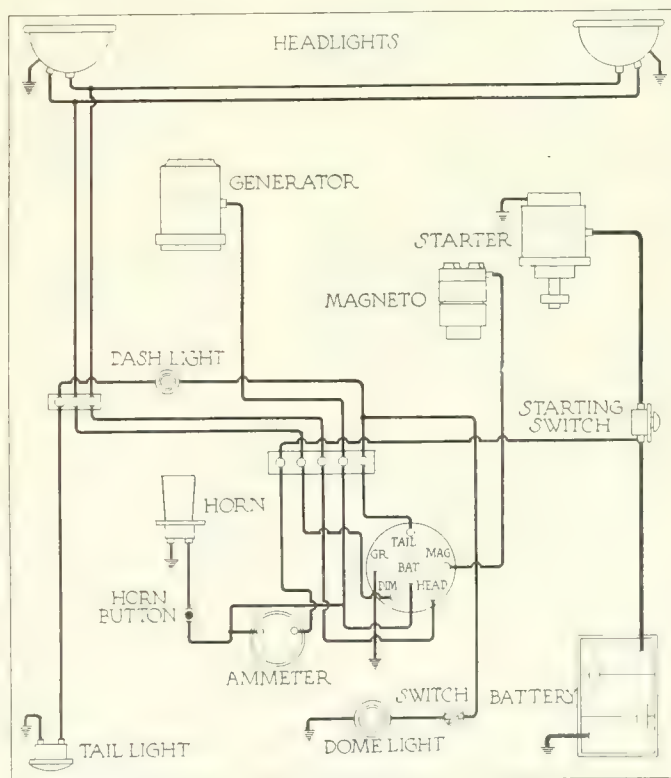
1920

- 1—Ford, Starting and Lighting.....Oct. 1
- 2—Acme, Lighting.....Oct. 15
- 3—Bethlehem, Starting and Lighting.....Oct. 15
- 4—Atterbury, Lighting.....Nov. 1
- 5—Ace, Starting and Lighting.....Nov. 1
- 6—Atlas, Starting and Lighting.....Nov. 15
- 7—Briscoe, Starting and Lighting.....Nov. 15
- 8—Defiance, Starting and Lighting.....Dec. 1
- 9—Commerce, Starting and Lighting.....Dec. 1
- 10—Grant, Starting and Lighting.....Dec. 15
- 11—Brockway, Starting.....Dec. 15

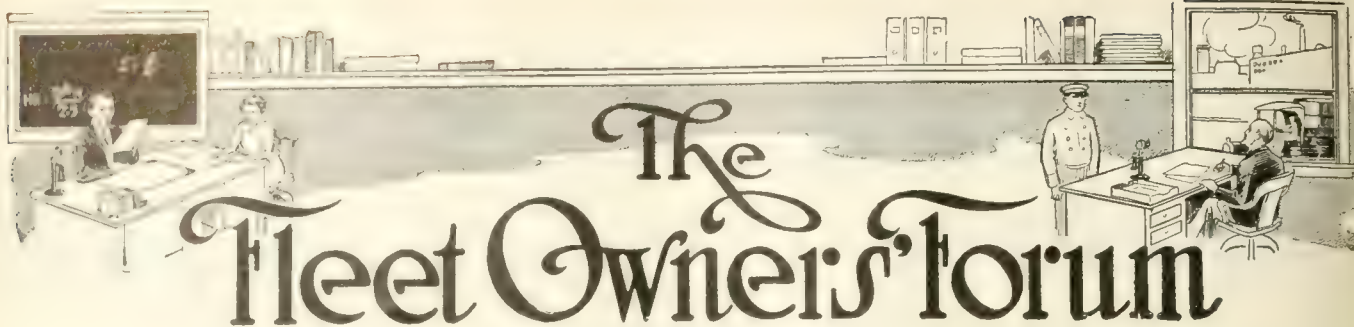
1921

- 12—Maxwell, Lighting.....Jan. 15
- 13—International, Starting and Lighting.....Feb. 1
- 14—Mack, Starting and Lighting.....Feb. 15
- 15—Vim, Starting and Lighting.....Mar. 1
- 16—Oldsmobile, Starting and Lighting.....Mar. 15
- 17—Reo, Starting and Lighting.....Apr. 1
- 18—Sterling, Starting and Lighting.....Apr. 15
- 19—Stewart, Starting and Lighting.....May 1
- 20—Kelly-Springfield, Starting and Lighting.....May 15
- 21—Riker, Starting and Lighting.....May 15
- 22—U. S., Starting and Lighting.....June 1
- 23—Wilcox, Lighting.....June 1
- 24—Pierce-Arrow, Starting and Lighting.....June 15
- 25—Republic, Starting and Lighting.....June 15
- 26—Parker, Starting and Lighting.....July 1
- 27—Noble, Starting and Lighting.....July 1
- 28—Oneida, Starting and Lighting.....July 15
- 29—Oshkosh, Starting and Lighting.....July 15
- 30—Knox, Starting and Lighting.....Aug. 1
- 31—Master, Lighting.....Aug. 1
- 32—Watson, Starting and Lighting.....Aug. 15
- 33—Service, Lighting.....Aug. 15
- 34—Packard, Starting and Lighting.....Sept. 1
- 35—Tiffin, Starting and Lighting.....Sept. 1
- 36—Napoleon, Starting and Lighting.....Sept. 15
- 37—Dorris, Starting and Lighting.....Sept. 15
- 38—Moreland, Lighting.....Oct. 1
- 39—Northway, Starting and Lighting.....Oct. 1
- 40—Rock Falls, Starting and Lighting.....Oct. 15
- 41—Locomobile, Starting and Lighting.....Oct. 15
- 42—Seneca, Starting and Lighting.....Nov. 1
- 43—Brockway, Starting and Lighting.....Nov. 1
- 44—Schwartz, Starting and Lighting.....Nov. 15
- 45—Garford, Starting and Lighting.....Nov. 15
- 46—Four Wheel Drive, Starting and Lighting.....Dec. 1
- 47—Jackson, Starting and Lighting.....Dec. 1

## 47—Starting and Lighting Unit on Jackson Truck



Starting and lighting wiring layout as used on Jackson four-wheel drive 3½-ton truck



# The Fleet Owners' Forum

## Interested in House-to-House Grocery Store on Wheels

To the Editor, COMMERCIAL VEHICLE:

Will you kindly send us any information you may have as regards a House-to-House Grocery Store on Wheels? There are a few firms in Hartford who are at present interested in an electric truck for this work and we are desirous of securing information as regards type of body used, etc.—W. M. THAYER, Hartford Electric Light Co., Hartford, Conn.

We have described one body that may interest you. This description appeared in the March 15, 1920, issue of THE COMMERCIAL VEHICLE, page 127. This covers the body used by the Four Seasons Grocery Co., Dallas, Tex.

Perhaps you have already heard that the Commerce Motor Car Co. has placed on the market a body that is designed for the house-to-house grocery business.

Miss Alberta Mason of New Orleans has designed a body especially for this class of work. This is mounted on a 2-ton truck and overhangs the wheels about 1 ft. on either side and extends some few feet over the back of the frame.

## Demountable Truck Body Descriptions

To the Editor, COMMERCIAL VEHICLE:

Please give me the dates and pages of your issues that contained descriptions of demountable truck bodies.—READER.

These are as follows: Oct. 15, 1919, page 209; Jan. 15, 1920, page 495; Feb. 1, 1920, page 10; March 1, 1920, page 80; Oct. 1, 1920, page 145; Feb. 15, 1921, page 37.

## Changes That Occur in Steel Crystalline Structure

To the Editor, COMMERCIAL VEHICLE:

Referring to the article entitled, "When Solid Tires Should Be Replaced," by Chas. Guernsey, chief engineer, Service Motor Truck Co., in the Sept. 15 issue, page 13, of THE COMMERCIAL VEHICLE.

The writer notes that the following statement is made: "Any piece of steel that is stressed to any great extent will eventually fatigue and break by crystallization. Fig. 2 shows the texture of steel as it appears through the microscope. Fig. 3 shows the same piece of steel after crystallization has taken place."

The writer is given the impression, after reading the above mentioned article, that the author maintains that the fine dense structure shown in Fig. 2 has changed due to various shocks and

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

strains to the crystalline structure shown in Fig. 3.

The writer does not understand how it is possible for steel to change its crystalline structure under repeated stress, as shown by the above mentioned microphotographs. It seems more reasonable to assume that the crystals in a piece of steel like Fig. 2 are broken

## Of Interest to the Buyer

THE 1922 motor truck specifications should prove of great interest to fleet owners. The development of truck transportation has reached that stage where trends in design have been worked out to take care of specific haulage conditions. Specifications should therefore be watched carefully.

The annual specification issue, which will be published by THE COMMERCIAL VEHICLE Jan. 1, 1922, will also contain a survey of the truck industry and a résumé of the parts situation as it affects design.

down under repeated stress rather than amalgamated into a coarse crystalline structure as shown in Fig. 3.—JAS. SORENSON, Metallurgical Engineer, Four Wheel Drive Auto Co., Clintonville, Wis.

When a metal undergoes plastic deformation, the individual crystals of which the metal is built up undergo a change of shape also, and they do this not by a process of plastic flow, but by a definite process of gliding or slipping, in which the various layers of each of the crystals slide over one another to a minute extent.

It is when these crystals can no longer resist deformation and slip that they undergo disintegration along the surfaces of slip. In this way a crack or fissure is formed and this creeps gradually from one crystal to the next until the entire piece is broken.

## Speedometer Readings for Oversize Tires

To the Editor, COMMERCIAL VEHICLE:

Below are given various speedometer corrections to be made when an oversize tire is used to replace a standard size tire on the front wheel. These corrections depend upon whether the fabric tire is replaced by another fabric tire, cord by another cord or whether a cord replaces a fabric.

Inasmuch as these figures are given in percentages, it will be necessary to add the figure noted on each 100 mile of speedometer reading.

Percentage of Speedometer Error (Too Slow)\*

Original	Oversize	Fabric to Fabric	Fabric to Cord	Cord to Cord
		Oversize	Oversize	Oversize
30 by 3½	31 by 4	3.3	3.6	6.0
32 by 3½	33 by 4	3.1	3.4	5.6
32 by 4	33 by 4½	3.1	3.1	6.0
33 by 4	34 by 4½	3.0	3.3	5.8
32 by 4½	33 by 5	3.1	5.0	8.0
34 by 4½	35 by 5	2.9	4.6	7.5

\*This applies to the speed readings as well as to the distance. For example, if a 35 by 5-in. cord is used to replace a 32 by 4½-in. fabric oversize, the speedometer error is 8 per cent, which will mean that the vehicle will travel 108 miles for every 100 miles registered by the car. It will also mean that when the speedometer indicates 50 miles per hour, the speed is 54 miles (add 8 per cent to 50).—Engineering Service Department, Kelly-Springfield Tire Co., New York City.

## Intake and Exhaust Valve Timing in an Engine

To the Editor, COMMERCIAL VEHICLE:

What is gained by the early opening of exhaust valves? What would happen if the intake valves were closed at a point equal to one-half of their usual closing time?—S. DRAKE, Norristown, Pa.

1. Exhaust valves are opened early for the reason that the last part of the stroke has very little power value and is better to sacrifice it in order to scavenge the exhaust gases as completely as possible.

2. This would result in seriously handicapping any engine for the reason that the full volume of gas could not get into the cylinders. As in the case of the early opening exhaust valves, the first few degrees of piston travel have very little compression value. In fact, the effect is so slight that the momentum of the inrushing gases is sufficient to overcome it. It is the aim of designers to close the intake valve at the exact point when the compression equals the momentum of the inrushing mixture.



## Number of Men Necessary to Take Care of 20 Trucks

To the Editor, COMMERCIAL VEHICLE:

I would like to know how many men you consider necessary to take care of a fleet of twenty trucks. They operate in all kinds of weather, over all kinds of roads and with all kinds of drivers. Their mileage averages 1500 to 2000 miles per truck per month. There are generally eight or nine trucks in the garage every night. The rest are most anywhere. Sometimes a truck will stay away for a week or so.

To take care of the trucks, I mean doing everything except painting and re-grinding the cylinders. Also the casing repairs are done outside. Tube repairs, changing tires, keeping tires pumped up, watching the batteries, hydrometer test once a week, all lubricating, cleaning and repair work is to be done by our own help.

The drivers do nothing but drive the trucks. All trucks present must be filled with water, gasoline and oil every morning. Tires to be tested once a week, also the batteries. Trucks are to be washed and windshields kept clean whenever necessary. One washing a week is enough, I believe. Crankcases to be oiled every 500 to 600 miles. Also the garage has to be kept clean. It is an up-to-date building about 100 by 20 feet. This is quite an order, but I would greatly appreciate any help you can offer regarding the upkeep of such a fleet of trucks.—READER.

Such a fleet should be efficiently handled by two men, a first-class mechanic and an assistant. There are a number of examples on which this conclusion is based and which I put out. For example, there are two tire firms in New York operating out of from ten to twenty trucks, all of which fleets are cared for by two men. The number of trucks may seem large for two men, you said that some trucks stayed away for a week and that there are generally eight or nine in the garage over night. The work to be done on this number should be handled by two men without difficulty. Of course the item which consumes the greatest amount of time in most cases is the daily work on trucks. That is: inspection, cleaning and washing. But I note you state that one washing is enough. In the case of some of the fleets mentioned above the washing is done every night or every other night. Therefore, this should not require so much time in your case.

Presumably repairs, inspection, the tire inspection and all similar work would be handled by the mechanic, while washing, pumping up tires, cleaning windshields would be handled by the assistant. Presumably also, if the drivers take any kind of care of their trucks, the repairs for the most part should be limited to adjustments which do not as a rule require much time. Of course if the fleet is standardized and a fairly large stock of spare parts carried it would be easier to fit in the work because in the event of a breakdown the damaged truck would be equipped with a new part and the damaged part repaired when convenient. But in any event we would judge that two men

working eight hours a day, or better, perhaps, eight hours a night, should be able to care for a fleet of twenty trucks and have some time to spare.

## Where Flanged Wheels May Be Purchased

To the Editor, COMMERCIAL VEHICLE:

Your Oct. 1 issue had an article with cuts, showing buses and trucks operating over railroad tracks.

We are interested in this kind of equipment, as we are figuring with parties who have twenty-five miles of track and wish to replace electrical equipment with buses and trucks.

Please advise us if possible where steel wheels may be purchased that can be used on motor trucks running over steel rails.—H. M. RUPE, Independent Motor Co., Youngstown, Ohio.

Flanged steel wheels for use on motor

## Is Your Knowledge Available?

HOW often have you remembered reading a certain article in THE COMMERCIAL VEHICLE and then found it impossible to locate? Nine times out of ten the particular issue has been mislaid. It would be a good plan to keep a permanent file.

In addressing this department, readers are requested to state whether a permanent file is kept, for many times inquiries to this department can be best and most fully answered by reference to previous issues.

trucks or buses operating on rails are manufactured by the following:

W. F. Holt, Holtville, Cal.

J. Blaine Worcester, Middletown, N. Y.

White Motor Co., Cleveland, Ohio.

In this connection we would refer you to articles published in the Forum Department of THE COMMERCIAL VEHICLE as follows:

June 15, 1920, page 343.

Oct. 1, 1919, page 192.

## Bus Service in Newark Started in 1916

To the Editor, COMMERCIAL VEHICLE:

Will you please give me a brief history of the motor bus business since its inception in Newark, N. J.? When did it begin and what prompted its introduction?—J. BAILEY, Plainfield, N. J.

Bus service in Newark started in 1916, the vehicles used being commonly known as jitneys. This service was prompted by lack of proper trolley service and the desire by individuals for automobile riding.

Ford cars were the first used; later, in 1917, 3/4-ton, twelve-passenger buses were placed in operation. This increase in size was prompted by increased desire for this method of passenger transportation.

Bus service was further advanced and became more popular when the municipalities passed ordinances governing bus operation.

During 1919 the tendency was for 1, 1 1/2-ton buses and change from solid to pneumatic tires. This was largely due to the tire makers perfecting pneumatics for truck use. It then developed that changing over from solid tires to pneumatics enabled operators to obtain an increased speed, thus increasing the number of round trips, which in turn increased daily revenue. But it also demonstrated that trucks primarily designed for solid tires, which were later changed over to pneumatics, would not give maximum efficiency. As a result, a number of the truck makers constructed chassis especially designed for pneumatic equipment, installing larger engines, changing gear ratios, etc.

The growth in bus operation started with a few touring cars and continued to its present status of about twenty lines in Newark alone, operating some 500 buses.

With one or two exceptions, where the operator of the line owns anywhere from two to fifteen buses, each bus is owned individually.

In the fall of 1919, legislation was proposed placing the bus lines in control of the State Public Utilities Board, this bill being known as No. 370. The bill was passed in the House, where an amendment was proposed, and the author of the bill, refusing to consider the amendment, the bill was lost in the debate which followed. This bill was defeated by the bus men, led by George Cowan and G. F. Seymour, Jr., legal representatives of the bus men.

The bus men, seeing what could be accomplished through an overnight effort, resolved to form an association composed of representatives of each line and retaining counsel to guide them in their legal affairs.

This association is known as the New Jersey Auto Bus Assn., and includes each individual line which has also adopted the association plan.

## Cause of Oil Pumping in Ford Engine with New Pistons

To the Editor, COMMERCIAL VEHICLE:

What is the cause of oil pumping in a Ford when the cylinders have recently been ground and fitted with new pistons and rings? How can it be remedied?—J. NELSON, Jacksonville, Fla.

Nothing other than poor piston and ring fit can account for the pumping action. The only remedy is the correct fitting of the pistons and rings.

## Correction

WASHINGTON, Nov. 23—Due to a typographical error, the U. S. Department of Agriculture, in its press notice to THE COMMERCIAL VEHICLE which appeared in the Nov. 1 issue, page 11, stated that the number of surplus motor vehicles allotted to the States was approximately 528,000, instead of 28,000.





## Value Prices on Trucks

WHEN the fleet owner buys a truck he is entitled to get full value for his money. In some instances he may be getting it. But in some instances he is not.

Of course, the purchase price must take care of the cost of marketing as well as the cost of production. But the cost of marketing cannot be excessive and give the fleet owner value for his money.

This over-pricing has probably had something to do with slowing up truck sales, for many fleet owners are still waiting, probably, for lower prices. But it has had even more important results.

There is a cry for lower prices on all necessities of life. Transportation must be cheaper to haul cheaper goods. But in order for truckmen, retailers, wholesalers and manufacturers generally to reduce their haulage costs, they must have a full value investment in their haulage units.

Of course, there are many influences which affect truck prices. For one thing, the variety of laws in different states cause the use of different capacity models in different states. This means that the truck manufacturer has to carry more models. And many models means smaller quantity production more money tied up in parts stocks and ultimately higher prices on the different models which are pro-

duced because of the higher cost of manufacture.

Eventually, it is to be hoped that the laws in different states on truck transportation will be standardized. This is a consummation which can be attained, at any rate. And it behooves every branch of the industry to work for it.

One manufacturer, however, has set a close price on his truck, has manufactured that truck in great quantities and has justified his price by reaping a golden harvest. If one man can do it, others can do it. And when it is done, sales will shoot up, transportation by truck will grow by leaps and bounds, the industry will benefit and the whole country will return that much faster, through cheaper goods, to more prosperous times.

There is no royal road to cheaper trucks. The truck owner must get value. A low-priced truck that cannot stand up under haulage conditions is an expensive investment, not an economical one. For it means high repair and replacement costs. But it is possible, as more than one manufacturer has shown, to sell a truck that will stand up at a price that is within reach.

When the manufacturers of trucks are selling real value in volume they will break the buyers' strike automatically and benefit the entire country.

## Another King Canute?

KING CANUTE sat on the sea shore below the tide line and commanded the tide to go back. And out in Yolo County, California, they have decided to keep trucks and buses off the roads altogether. The one attempt has about as much hope of success as the other, for trucks and buses have come to stay.

But there is no smoke without fire and a decision as drastic as the above is not arrived at without some reason. The resolution adopted by the board of supervisors of the county states that Yolo County has expended \$1,000,000 on highways and that California has expended \$2,000,000 on similar work within the county; that the trucks and buses cause almost irreparable damage to these roads, often destroying them and paying nothing for their upkeep, and that, therefore, it has been decided to keep these vehicles off the highways *at least until such time as*

*the operators of these lines obey the laws against speeding and overloading.* And the Yolo County Board of Trade and the Business Men's Association have gone on record as supporting the supervisors.

If there ever was one, this is a case for quick action on the part of the well-organized California truckmen's associations. There is a happy medium between letting trucks and buses run wild and legislating them off the roads altogether.

But there is another side to the question: the supervisors' side. And if the associations take up this question they would do well to see to it that the trucks and buses in Yolo County stick within the law on speeding and loading.

Certainly the supervisors are wrong in taking so drastic a step. They are worse than wrong—they are unprogressive. But it is probable that there is a good deal of wrong on the other side also.



## Tire Makers Make Big Price Reductions

**Cuts Range from 10 to 30 Per Cent—Most All of Big Companies Fall in Line**

AKRON, Nov. 16.—Price reductions on fabric and cord automobile tires ranging from 10 to 30 per cent and effective Nov. 15 have been made by the Goodyear Tire & Rubber Co., the Miller Rubber Co. and the General Tire & Rubber Co.

The revised price schedules of the major rubber companies bring tire prices down to a level ranging from 10 to 15 per cent below pre-war figures. The significant feature of the price reductions is that the new lists cut down the margin of difference between fabric and cord tires, making it possible for cord tires to be bought within 25 to 30 per cent as cheaply as fabrics.

The new Goodyear reductions are 30 per cent on the 3½ inch and 4 inch straightside cord tires, 25 per cent on 3½ inch clincher cord tires and 20 per cent on all 4½ and 5 inch straightside cord tires. Cuts on fabric tire prices range from 10 to 20 per cent. Goodyear makes no announcement at this time of reductions in motor truck tire prices.

The Miller company's cuts range from 10 to 30 per cent, averaging 10 per cent on fabrics and from 20 to 30 per cent on cords. Truck tire prices are reduced from 10 to 20 per cent. The general revisions are 20 per cent on cords and from 10 to 20 per cent on fabrics and 10 per cent on truck tires.

NEW YORK, Nov. 15.—A reduction in prices on its full line of tires, including cords and fabrics for passenger cars and solid and pneumatic tires for trucks, has been announced by the United States Rubber Co. The reduction cannot be calculated on a percentage basis because the prices vary according to type.

The 30 x 3½ fabric casing has been reduced to \$10.90 from \$15.75. This heavy cut is said to bring the price of this size lower than it ever has been made by any one of the "big four." It is stated that the announcement of the reduction is made at this time to aid dealers in making their plans for 1922. The new prices, which became effective Nov. 11, will extend to tire purchasers throughout the country.

NEW YORK, Nov. 15.—The C. Kenyon Co., Inc., announces reductions ranging from 8 per cent to 10 per cent on its various sizes of cord tires and tubes. It also announces a new line of brown tubes, the prices of which range from 30 cents to 90 cents less than its red tubes. The company also announces a new line of heavy service tires and tubes. These tires range in size from 30 x 3½ to 36 x 6. The tubes for this line run in size from 30 x 3½ to 44 x 6.

## Trucks to Haul 10,000,000 Gallons of Fuel

SALT LAKE CITY, Nov. 21.—The Utah Oil Refining Co., this city, it is stated, proposes to purchase a fleet of trucks to haul 10,000,000 gal. of gasoline and kerosene in a 50-mile radius of Salt Lake City.

AKRON, Nov. 18.—The B. F. Goodrich Co. has announced drastic tire price reductions, effective immediately. The reductions are on practically all sizes of fabric and cord automobile tires, solid and pneumatic truck tires and inner tubes.

On the popular sized cord tires the price cuts average over 22 per cent. The Goodrich schedules make the following reductions:

Sizes	Old Price	New Price
30 x 3½ cords	\$24.50	\$18.00
32 x 3½	32.90	25.50
31 x 4.....	40.70	29.40
32 x 4.....	41.85	32.40

The percentages of cuts taper down according to the larger size tires, being from \$65.10 to \$57.60 on the 37 x 5 and from \$61.90 to \$54.75 on the 35 x 5. Fabric cuts are smaller comparatively, the larger cuts being made in cord prices to bring cord tires nearer the fabric tire costs, Goodrich officials say.

As Goodrich led the field with a 20 per cent cut last May, the new cut carries Goodrich prices to their lowest level, based on mileage records.

SYRACUSE, Nov. 18.—Syracuse Rubber Co., Inc., manufacturer of Syra-Cord tires, has announced, effective immediately, a 20 per cent reduction on its cord casings; 20 per cent on its fabric 30 x 3½ special five ply; and 10 per cent on its cord truck casings, fabric regular casings and cord tubes. The reductions are from the price list of Sept. 1, 1921. The company has added a 30 x 3 fabric tire to its line.

NEW YORK, Nov. 18.—Reductions which bring prices of its product identical with those of the Goodyear Tire & Rubber Co. have been made by the Keystone Tire & Rubber Co., effective immediately.

NEW YORK, Nov. 18.—Republic Rubber Co. announces that it has revised its price lists to be in accord practically with the general revisions in pneumatics now being put into effect by other tire manufacturers.

### Goodrich to Produce New Tire

AKRON, Nov. 18.—While official confirmation is lacking, it is understood that the B. F. Goodrich Rubber Co. soon will bring out a new low price tire to be called the "Black Diamond." It is reported that the price for the 30 x 3½ size will be about \$10.60.

## Old Truck Taxes Are Retained

**Senate and House Conferees Place Trucks on Same Basis as Candy**

WASHINGTON, Nov. 18.—The Senate and House conferees on the tax revision bill have agreed on the manufacturers' tax which shall apply to motor vehicles and automotive equipment. No change has been made in the old scale, which is as follows:

Automobile trucks and automobile wagons, including parts and accessories, 3 per cent.

Other automobiles and motorcycles, including parts and accessories, 5 per cent.

Tires, inner tubes, parts or accessories for motor vehicles sold to any person other than a manufacturer or producer of motor vehicles, 5 per cent.

In addition to motor vehicles, this stigma taxation will apply, under the agreement of the conferees, only to yachts and motor boats costing more than \$100; cameras, candy, firearms, hunting and bowie knives, daggers, sword canes, metallic knuckles, cigar and cigarette holders, automatic slot device vending machines, servants' liveries, hunting and shooting garments, works of art and a few other luxuries which cost more than a stated amount.

An agreement has been reached for a repeal of the taxation which had been in force on furs, musical instruments, sporting goods, moving picture films, chewing gum and electric fans.

As a result of the decision of the conferees, motor trucks which are expected to save the country from disaster in the event of a railroad strike are taxed on the same basis as candy. Passenger cars, which President Harding has stated are an indispensable part of the life of the country, are taxed on the same basis as automatic vending machines.

## Truck Price Reductions

NEW YORK, Nov. 17.—The Walter Motor Truck Co. has reduced the price of its 5-ton model from \$5,600 to \$4,850.

DETROIT, Nov. 18.—The Commerce Motor Car Co. announces prices on the new Commerce truck as follows: 1¼-ton (pneumatic equipped) \$1,450; 1½-ton, \$1,695; 2-ton, \$1,995, and 2½-ton, \$2,150. Pneumatic equipped prices on the three latter are \$1,800, \$2,150 and \$2,495.

## Toledo Bus Line Formed

TOLEDO, OHIO, Nov. 19.—The Toledo Bus Transportation Co. has been incorporated with a capital of \$100,000 to operate bus lines in Toledo and also outside of the city limits, connecting with other cities and towns. The incorporators are Frank J. Westhoven, Howard W. Tassell, Ross R. Horlocker, Harry A. Schmihl, Guy N. Henton, Ernest Kureach and others.



## Terminal Delays Are Costly in England

### Improved Loading and Unloading Devices Necessary—Standing Costs High

LONDON, Nov. 10 (By Mail).—W. Williamson, engineer to Walker Bros., makers of Pagefield trucks, in a paper at the Truck Congress during the recent Olympia truck show dwelt on the problem of reducing terminal delays—the greatest bugbear of road transportation in Britain.

The problem of reducing delays, terminal and intermediate, he pointed out, divides itself into three sections:

1 The provision of specially equipped bodies facilitating the rapid handling of loads in detail or the provision of detachable bodies with suitable mechanism enabling them to be run rapidly on or off the chassis.

2—The provision of special equipment at the motor user's loading stage, as, for example, cranes, ramps or runways.

3—The special equipment of the chassis itself, as, for example, the fitting of gear for operating a tipping body, an overhead crane for loading purposes, or a winch operated by the engine power.

A 7,000-lb. truck at present averages about 30 shillings a day for standing costs, which is equivalent under normal exchange to 8 cents a mile per 90 miles daily; and 12 cents for 60 miles per day. This represents a constant loss of 4 cents a mile, and on a yearly mileage of 12,000 is equivalent to a cost of £100. To equip a truck with a gantry frame and runway and interchangeable skip, bodies would cost about this sum, yet it is the exception here to find a truck so fitted; at most, one sees only a power windlass and occasionally a derricking crane slung at the back.

## Rockford Traction Co. Orders Buses

ROCKFORD, ILL., Nov. 26—Orders have been placed by the Rockford City Traction Co. for six White motor truck chassis, which will be equipped with bus bodies, delivery to be made on Jan. 15. The cost will be \$42,000. These buses will be operated by the street car company as feeders to the trolley lines and will be assigned to suburban districts not yet reached by the trolley car.

The front entrance of each bus has a width of 25 in. and is reached by two short steps. The interior width will be 12 ft.; the height, 6 ft. 6 in.; the length, 15 ft. Each bus will carry 25 passengers comfortably. The wheelbase will be 198 in.

The engine exhaust, through a pipe system running through the buses, will provide the heat. Seven electric bulbs will take care of the light. Electric buzzers to notify the driver of stops will be a convenience for the patrons.

All patrons will be given transfers to the trolley cars without extra charge. This move upon the part of the street railway company marks the latest devel-

## Would Seal Truck Engines

NEW YORK CITY, Nov. 18—President F. H. LaGuardia of the Board of Aldermen states that he will ask the Aldermen to insert in the ordinance regulating heavy traffic a provision compelling all heavy trucks to have their throttles sealed, or some other automatic arrangement under seal placed on trucks, thereby making it impossible for them to exceed the legal speed limit.

The proposed ordinance will include all trucks except those of the Fire Department, and will purposefully include mail trucks.

opment of the long continued conflict between the Fay Motor Bus Co. and the trolley company. The city council has been inclined to favor the latter and, when it became necessary to reach a choice as to the continuation or elimination of the trolley cars, voted by a narrow margin to permit the continuation, with the supplementary bus service. The Fay company will continue operation but under a more restricted scale than was hoped by the owner. Buses will not be permitted upon streets occupied by the trolley car lines.

## Bus Service in Spokane

LANSING, Nov. 16.—The Olds Motor Works has received an order from the city of Spokane for sixteen Oldsmobile truck chassis. The trucks will be shipped at once and will be used by the city as the nucleus of a municipal bus service which will aid in facilitating the handling of passenger traffic within the city.

## The Last Link in Transportation

(Continued from page 11)

etc., it will be necessary for it to raise new capital. In the past the company has been given the hearty support of all of the town banks along the routes. These banks, realizing the need of this means of transportation, are often instrumental in getting the farmers to invest in stock through showing them that by aiding the company they are in turn also benefitting themselves through better service.

To date, there are over 500 stockholders in the company, most of whom are farmers. The company realizes the importance of this financial support as a factor in determining the confidence of its patrons. Before opening a new route, it requires the entire support financially of all the farmers along that specific route. But it is highly indicative of the success of the plan that the farmers themselves, seldom sold on, or even interested in, motor trucks to any appreciable extent, are back of the Tidewater Lines not only with their patronage but with their money.

## Must Obey Laws or Stay Off Roads

### No New Permits to Truck and Bus Lines to Be Issued in Yolo County, Cal.

WOODLAND, Cal., Nov. 16.—The board of supervisors of Yolo County have decided to issue no new permits for the operation of motor truck and motor bus lines, and to renew no old permits when their time limit expires. The Yolo County Board of Trade and the Business Men's Assn. have gone on record as supporting the supervisors.

The resolution adopted by the board of supervisors states that Yolo County has expended \$1,000,000 on highways, and that the state of California has expended \$2,000,000 on similar work within the county; that the trucks and buses cause almost irreparable damage to these roads, often destroying them, and pay nothing for their upkeep, and that, therefore, it has been decided to keep these vehicles off the public roads, "at least until such time as the operators of these lines obey the laws against speeding and overloading."

## Enjoins Columbus Bus Regulation

COLUMBUS, OHIO, Nov. 22—Upon the application of Carl Johnson, operating a motor bus line to Harrisburg from Columbus, a temporary injunction has been granted by Judge Kinkead in common pleas court against the enforcement of the newly adopted city ordinance regulating motor bus lines. In his petition Johnson alleges the ordinance seeks to regulate buses operating both in and outside of the city, which is under the province of the Ohio Utilities Commission.

The ordinance as adopted recently seeks to place a license fee of 1 cent per mile for the upkeep of the streets and to make each bus carry liability insurance in the sum of \$25,000 to indemnify injured persons or property. The matter will come up for final hearing soon.

## Connecticut Bus Owners Hit Hard

BRIDGEPORT, CONN., Nov. 22—Action of the state Public Utilities Commission in ordering the Connecticut Company to restore 5-cent trolley fares on all city lines, effective the 20th for a trial of ninety days, has served as a death blow to former bus owners who have been hoping that the bars against them would be let down. Bus owners who have been in idleness for some weeks, hoping to get back into service, have been making an exodus to other fields. Buses which have been held idle in hope of eventually being used again, are now being sold or transported to other cities. Only hope of a bus increase here is now based on trolley service being inadequate and the fact that, under the reduced fare schedule, no transfer privilege is allowed.



## Considers Safety and Road Wear

### Connecticut Determines Truck Weight Limit of 25,000 Pounds

HARTFORD, CONN., Nov. 15.—The State of Connecticut last week decided that it will absolutely refuse any further permission to truck owners who wish to drive their vehicles with loads that shall exceed 25,000 lb. The load per inch width of tire shall not exceed 800 lb. This is a definite and final provision of the law and the policy of the highway department is that, except with certain conditions, there will not be any allowance granted in connection with these provisions.

Complementary to these provisions, truck makers who may certify that their trucks are properly designed to carry more than their rated load—the load on which the trucks are taxed by the State—will be permitted to let their customers so register the trucks of these makers, but at the higher fee which goes with the higher capacities.

"The whole proposition takes into account the subject of overloading from two standpoints," Motor Vehicles Commissioner Stoeckel pointed out. "One is the wear on the roads and the other is the safety factor of the vehicle concerned in the overloading."

### Buses Operating in Seattle

SEATTLE, Nov. 16.—Another episode in the five-year fight to protect this city's street car system from motor bus competition began Nov. 24, when motor buses commenced operation between the downtown business district and Roosevelt Heights outside the city limits. City officials recently ruled motor buses off the streets, but the recent grant of a certificate of convenience by the State Department of Public Works allows the Sound Transit Co. to operate buses.

### Indorse Sheppard Bill

CHICAGO, Nov. 22.—The executive committee of the Shippers' Warehousing and Distributing Association, comprising traffic representatives of some of the leading manufacturing companies of the country, has indorsed the Sheppard Senate bill to encourage highway motor transportation in the United States.

### Burke Bill the Main Subject at Ohio Convention

TOLEDO, Nov. 22.—The Substitute State Senate Bill No. 34, known as the Burke Bill, will be fully discussed and will be the main subject that will come up at the State convention of the Ohio Association of Commercial Haulers at Columbus on Jan. 6 and 7. The convention will be held at the Chittenden Hotel. This bill, which became effective Sept. 7, if enforced, means an enormous loss of

### Hylan Would Spend \$10,000,000 for New York Buses

NEW YORK CITY, Nov. 22.—Mayor Hylan announced at a conference of city department heads, called to consider amendments to existing laws to be presented at the next session of the state legislature, that the city would ask the legislature again for authority to operate buses. "We are prepared to spend \$10,000,000 in the purchase of well-lighted, comfortable and well-ventilated buses," he said.

equipment. It provides that not more than 70 per cent of the weight of truck and load can be concentrated on the rear axle. This is manifestly unfair, as there are a number of trucks that exceed this limit even when empty, not including some 220 makes ranging in size from  $\frac{3}{4}$  to five tons that exceed 70 per cent when loaded.

There are other unfair provisions in this bill that if enforced will work a great hardship on commercial haulers in Ohio, when it is figured that about 1,500,000 tons of freight are being moved monthly by trucks, the unfairness of this bill is all the more apparent.

The Ohio Association of Commercial Haulers is organizing to get support to either repeal or amend this bill, and as a result, the coming convention will be important. Six States will be represented.

### Indiana County Commissioners Convene

FORT WAYNE, IND., Nov. 16.—The eighteenth annual convention of the County Commissioners' Association of Indiana was held in this city, Nov. 9 to 11. H. R. Curry, president of the Monon Railroad, went on record as being against high priced highways as a waste of public money. His address was "Railroad's Interest in Highway Improvements." Tom Snyder, secretary of the National Association of Commercial Haulers, in his address discussed transportation problems. "The Economic Value of Roads" was the subject discussed by F. A. Cannon, executive secretary of the Wisconsin Good Roads Federation.

### Conference to Discuss Indiana Road Construction

INDIANAPOLIS, Nov. 25.—The Indiana division of the National Association of Commercial Haulers has arranged a discussion conference between the executive officials of the Indiana Transfer and Warehousemen's Association and the Indiana Highway Commission, to be held Dec. 2. The object of this conference is to discuss with the commission road construction as it is now being carried on, and the sustaining and service capacity of such highways in meeting the future transportation demands over such highways.

## Des Moines to Vote on Bus Issue

### Chicago Court to Decide the Right of Trolleys to Run in Fox River Valley

DES MOINES, IOWA, Nov. 15.—This city and Chicago will be involved this month in deciding the bus-street car issue. Des Moines on Nov. 28 will vote on a new franchise for the street car company, and the Federal Court in Chicago will be called upon to decide on Nov. 21 whether the street car system in Aurora, Elgin and other towns in the Fox River valley district can be compelled to operate at a loss in competition with the buses.

In Des Moines the people will vote on a franchise calculated to restrict bus competition and to permit resumption of street car operations after eleven weeks' idleness. The new franchise calls for operations under a service-at-cost arrangement with an initial eight-cent cash fare, to be lowered whenever returns justify a readjustment of fares.

Under the proposed plan, no dividends will be paid on common stock while cash fares are in excess of seven cents. Beginning at seven cents, a dividend of 3 per cent will be paid on common, and as fares go down, dividends will increase until common pays 7 per cent, whenever a five-cent fare is reached. Provision is also made for fares above eight cents or below five cents whenever conditions warrant. Interest and dividends on outstanding securities except common stock is to be guaranteed, and the city is given the right to purchase the entire system at any time on six months' notice.

With respect to the Fox River valley lines, the city officials of Aurora, Elgin and other communities are to show cause why the street car lines should not be discontinued, since they have been operating under a receiver and at a heavy loss, due to bus competition.

The situation was brought to a climax by recent demands of the local communities that the companies aid in improving the city's streets, for which obviously they had no money.

### Franchises for Beaverton Buses

BEAVERTON, ORE., Nov. 16.—Motor bus and freight trucks that operate in this city after Dec. 1 will be run under a franchise. The terms of the franchise are left to the option of the city council, which has the right to grant or refuse a franchise. Similar ordinances have been passed at Newberg, McMinnville, Oregon City, West Linn, Scappoose and many other towns. Oswego is putting a similar ordinance into effect.

### Pays \$18,000 for Licenses

HARRISBURG, PA., Nov. 21.—A single check for \$48,000, covering the application of the Atlantic Refining Co. for truck licenses in Pennsylvania, has been received by State Highway Department.



## Mileage Guarantee on Tires Dropped

### New Warranty Gives Makers Option to Pass on Defective Products

NEW YORK CITY, Nov. 16—After an exhaustive consideration of the subject of mileage guarantees on tires, the tire manufacturers' division of the Rubber Association of America has adopted the recommendations of a special committee providing for elimination of mileage guarantees and the adjustment abuses which have resulted. As a substitute, manufacturers have adopted the following standard warranty:

"We do not guarantee pneumatic automobile tires for any specific mileage, but every pneumatic automobile tire bearing our name and serial number is warranted by us to be free from defects in workmanship or material."

"Tires claimed to be defective will be received only when all transportation charges are prepaid and when accompanied by this company's claim form duly filled out and signed by owner. If, upon examination, it is our judgment that the direct cause of the failure of the tire to render satisfactory service is attributable to faulty material or workmanship, we, at our option, either repair the tire or replace it for a charge which will compensate for the service rendered by the returned tire, based upon its general appearance and condition."

"Pneumatic automobile tires in which a substitute for air has been used, tires used when not inflated to the pressure recommended by us, used under loads in excess of those recommended by us, used on wheels out of alignment, abused or misused, used on rims other than those bearing these stamps, ( ), ( ), ( ), or which have been injured through accident or design, are not subject to claim hereunder."

## Pennsylvania Makes Changes in Classification

HARRISBURG, Pa., Nov. 21—Changes in the classification of trucks with reference to chassis weights, fees, and maximum over-all weights allowed, are presented in the following table:

Class	Chassis Weight Lb.	Tire Fee		Max. Cap.
		Pneumatic	Solid	
AA	2,000-2,999	\$24	\$30	7,000
A	3,000-3,999	32	40	11,000
B	4,000-4,999	40	50	13,000
C	5,000-5,999	56	70	18,000
D	6,000-7,499	80	100	22,000
E	7,500-8,499	100	125	25,000
F	8,500 and over	140	200	26,000

Trucks having chassis weight of less than 2000 lb. are registered on the basis of horsepower rating, with minimum fee of \$15. A truck-tractor with semi-trailer attachment is registered as one vehicle, with fee computed according to table of weight and the fees specified for trucks and upon the basis of the chassis weight of the tractor, plus the weight of the attachment. The fee for registration of any trailer with metal tires is double the regular fee for trailers.

## New Lighting Rules in Indiana

INDIANAPOLIS, Nov. 20—Secretary of State Ed Jackson to-day announced new lighting rules for motor vehicle headlights of state to go into effect thirty days from date of announcement. Regulations based on illuminating engineers'

## Express Executive Lauds Motor Trucks

NEW YORK, Nov. 18—The following statement in reference to the value of the motor truck in commerce has been made by R. E. M. Cowie, vice-president of the American Railway Express Co.:

"The value of the motor vehicle as a means of transportation cannot be over-estimated; the things that it has accomplished even thus far are marvelous in the extreme. From an experience of a great many years, with all types of transportation, I have come to the conclusion that there is very much of a distinct place for the motor vehicle, either propelled by electricity or by gasoline."

"Until a few years ago the express traffic of the country was conducted very largely by horses and wagons, which are in these days regarded as a slow and tedious means of transport. It is very unfortunate that horse-drawn vehicles and motor vehicles have to operate on the same highways, because the horse-drawn vehicle is very apt to restrain the speed of the traffic, recognizing the naval theory that the speed of a fleet is the speed of the slowest collier in the fleet."

specifications virtually the same as those in New York, Massachusetts, Connecticut, Maine, Ohio, Pennsylvania, Vermont, Wisconsin, Iowa and other states. Four-point test varying regulations are prescribed for passenger automobiles, slow-moving trucks and motorcycles. In addition to setting forth requirements for deflecting devices, the regulations provide for use of auxiliary bulbs in front headlights, or resistance type dimming of the main bulbs. It is provided on well lighted streets or highways, cities and towns may require use of these bulbs or dimmed lights no matter if headlights are equipped with legal deflecting devices.

## Stoughton Plant Burned

STOUGHTON, Wis., Nov. 18.—Twenty complete trucks and the truck plant of the Stoughton Wagon Co. were destroyed yesterday by a fire which for a time threatened a part of the town.

## Coming Events

1922

Jan. 6-7, Columbus, Convention of Ohio Ass'n of Commercial Haulers, Hotel Chittenden.  
Jan. 19-25, Milwaukee, Wis. Truck Show, Auditorium.  
Jan. 30-Feb. 2, Boston, 6th Annual Conference of International Delivery Ass'n at Copley Plaza Hotel.  
Feb. 6-9, Scranton, Pa., Truck Show, Armory.  
Feb. 12, Madison, Wis., Truck Show, Cartwell Bldg.

## Decatur Bus Lines In Merger

### Two Lines Will Operate Separately—No Paralleling of Trolley Lines

DECATUR, ILL., Nov. 23.—The Union Transport and the Borden Bus Line have consolidated but will operate separately. The former is capitalized at \$30,000 with E. E. Houck as president and R. A. Dillinger as secretary, while the latter is capitalized at \$25,000 with John Borden as president and Floyd Borden as secretary. It is expected that the two companies will take care of the field.

The city council has declined to give the Illinois Commerce Commission blanket authority to designate the streets upon which buses can operate. The council reserves the right to make such designation but has made it clear that the buses may not operate upon any street served by the trolley line. It is pointed out that there is abundant territory not served by the trolley lines and it is this field which must be served by the motor vehicles. It is believed that the compromise measures will permit the trolley line to make a reasonable profit and also take care of the bus lines.

## Bus Terminal in Eugene

EUGENE, ORE., Nov. 21.—The Central Stage Terminal and Hotel Co. has leased a part of the Elks' Building in this city where it will open up a most complete stage terminal. At least two interurban lines will make their headquarters at this new terminal. They are the Barker Motor Bus Co., which is operating a fleet of trucks to northern points as well as a fleet of inclosed limousine-type stages used on the run to Salem, and the Arch Taylor Rosenberg line which has been in operation here for some time. All feeder lines, meaning the smaller stages to Lane County points, will maintain schedules that will dovetail with the interurban schedules. Passengers to Portland will be transferred from the Eugene-Salem stages to any of the fifteen other machines at the Salem terminal. Two-hour schedules will be maintained in the winter time and hourly schedules in the spring and summer.

## Alcohol Permit Not Needed

BRIDGEPORT, Conn., Nov. 18.—In response to numerous inquiries made of the State prohibition and internal revenue offices relative to the legality of using alcohol in automobile radiators to prevent the freezing of radiator water in cold weather, Chief Deputy Collector Howard P. Dunham has ruled that no permits are required or Government taxes expected for the use of denatured alcohol.



The

COMMERCIAL VEHICLE

Read by Fleet Owners

Reg. U. S. Pat. Off.

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President

W. I. Ralph, Vice-PresidentE. M. Corey, Treasurer

A. B. Swetland, General Manager

David Beecroft, Directing Editor

U. P. O. Building

239 West 39th Street, New York

CONTENTS

Vol. XXV, No. 10December 15, 1921

LEADING ARTICLES

Distribution De Luxe!	7
Bus Development in Illinois	14

MISCELLANEOUS ARTICLES

Try This on Your Bus Line	11
How They Are Getting the Facts	12
Motor Trucks to Handle It All	13
Is It Store Door Delivery?	16
Do You Carry Your Share?	19

DEPARTMENTS

The Better Way	20
Buyer's Department:	
New Method of Control on Electric Truck	24
Five Models Comprise Schacht Line	25
Truck Accessories	26
Shop Equipment for Fleet Owners	28
Three-Way Dumping Mechanism of the Hydraulic Type	30
Motor Truck Electric System Wiring Diagrams	31
The Fleet Owners' Forum	32
Editorial: The Bus and the People	34

NEWS

Indiana Association Wants Higher Fees	35
Parts Makers Join in Service Plan	35
Ruling Permits Truck Competition	36
Western Railroads to Use Mack Cars	36
70 Buses Operating in Toledo	37
Annual Report of Fifth Avenue Coach Co.	37
Overload Certificates Opposed by N. A. C. C.	38
New Highway Plan for New York	38
Index to Advertisers	58-59

The Commercial Vehicle

Charles W. Blackman, General Manager

EDITORIAL DEPARTMENT

Sinclair Gluck, Managing Editor

F. Eugene Spooner, Technical Editor

Published on the first and fifteenth of the month. Entered as second class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879.

BRANCH OFFICES

Chicago, Mollers Building, 59 East Madison Street

Detroit, 317 Fort Street West

Cleveland, 536-540 Guardian Bldg.

Philadelphia, 1420-1422 Walnut Bldg.

Boston, 185 Devonshire Street.

SUBSCRIPTION RATES

United States\$2.00 per year

Extra Postage west of the Mississippi River on account of Zone I Postage Law

Canada\$3.00 per year

Foreign Countries\$4.00 per year


ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication.

Owned and copyrighted, 1918, by United Publishers Corporation.

Address 243 West 39th St., New York.

H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



Truck Fleet Owners  
Send This Coupon

Zenith Carburetor  
DETROIT, MICH.

Kindly furnish me with an estimate on the cost of installing a Zenith Carburetor on my  
(Name and Model of Car)

Name

Address

Learn How We Guarantee  
to Save You Money

Zenith carburetors are guaranteed to increase the gasoline mileage, add to the power and improve cold weather starting of any truck.

30 Days Free Trial

They are non-adjustable. Operators cannot tinker with them. Fleet owners therefore find the cost of operating all Zenith equipped trucks is uniform and that service costs are less. We will prove these statements free to any truck fleet owner, on a 30-day free trial.

Send us the coupon. We will make arrangements for the test without inconvenience or cost to you. We will have experts install Zeniths on from one to six trucks of a fleet so that their operation need not be interrupted. Then you can test the comparative operating costs.

No Time Lost for Installation

Zenith service stations are located in practically every city. They are managed by competent carburetor men. And this is important. They can serve you when need arises, make installations and give expert advice.

Zenith Carburetor Company  
Detroit, Michigan

ZENITH



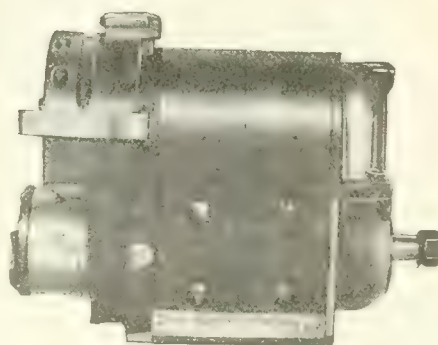
*THE ORIGINAL  
ROBERT BOSCH*



# QUALITY PRODUCTS

*If You Want*

*Highest Motor Efficiency  
Best Motor Service  
Maximum Mileage Service*



*Minimum Ignition Trouble  
Lower Fuel Cost  
Lower Maintenance Cost*

*INSIST on The Original Robert  
Bosch Ignition System*

*for your*

*Truck, Tractor, Motorboat, Airplane, Motorcycle  
or any other Motor or Motor Vehicle*

**ROBERT BOSCH MAGNETO CO., Inc.**

OTTO HEINS, *President*

123 West 64th Street

::

::

New York, N. Y.

*Write for Address of Nearest Dealer*



# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXV Dec. 15, 1921 No. 10

---

## DISTRIBUTION DE LUXE!

---

### *How the Columbia Terminals Co. Handles the L. C. L. Freight of St. Louis, Link- ing Together Twenty-Six Railroad Lines*

**I**N the city of St. Louis, a group of big business men have recognized that the transportation of freight by motor truck is a field worthy of their activities. And now, in that city, a fleet of motor trucks, wagons and truck trailers is the connecting link in the exchange of freight shipments of less than carload lots between twenty-six railroad lines of the East and West that center in St. Louis and contiguous territories.

And, although not a corporate part of any of the railroad lines, this fleet is now a vital essential to all, in the efficient handling of freight between these lines and to the consumer in that territory.

The Columbia Terminals Company of St.

Louis, with 170 horse-drawn vehicles, 75 motor trucks, and 35 tractors drawing 150 Lapeer semi-trailers, hauls practically all of the freight of less than car load lots that is interchanged between the Western lines terminating in St. Louis and the Eastern lines with depots in East St. Louis, Ill., across the Mississippi River.

In addition to this, it carries to its own warehouses on either side of the river shipments that arrive over different lines for St. Louis or East St. Louis points. From there the consignee can gather in at the same time all of the articles that may have been shipped from a dozen different points and over a dozen different railroads.

---

# An Extensive Development of the Truck Terminal Idea and What It Has Accomplished for St. Louis

**S**T. LOUIS was confronted with the same barrier that was the problem of other great cities and industrial centers; industrial districts and business buildings got in the way of the direct route of railroad lines, the Mississippi River separated the East from the West.

Railroads could not secure space in industrial districts for the erection of their own depots, and, had they done so, the great problem of segregating the freight for an individual shipper from a dozen or more lines would not have been solved. Furthermore, the cost to railroads of operating depots on the opposite side of the river to their terminals was one that could not be considered lightly.

There existed in St. Louis in 1900 various transfer concerns that made a business of hauling freight from the Illinois side to the St. Louis district and depots, and vice versa. In 1902 the Columbia Transfer Co. entered the field. There was considerable competition, and eventually the St. Louis Transfer Co. became the leading factor in the interchange of freight.

## Began Operating in 1904

In 1904 the Columbia Transfer Co. opened its first depot for the handling of in and outbound freight, and for the exchange of what is called "connecting line business." In 1910 the rates of the railroads of the East, terminating in East St. Louis, were made to apply to St. Louis.

Since April, 1918, when the Columbia bought out the St. Louis Transfer Co., the concern has been slowly motorizing its entire equipment, there being only slightly more than half the number of horse-drawn teams that formerly were used. The consolidated businesses of the two companies was given its present name after one year.

## Bonus System Used

The business of handling this freight is carried on with as great efficiency and, perhaps, with comparatively as large a force as many great railroads. The basic principle is "Service," and every employee is impressed with the importance of efficiency.

To increase the efficiency of drivers, chauffeurs and station employees, and to make them careful in the handling of shipments, a bonus is paid on the basis of tonnage handled above a fixed minimum. Many elements enter into this, however, certain demerits being charged against an employee who is careless in

his work, and, although he may handle tonnage in excess of the allotted minimum, he receives nothing extra if the quality of his work is below a fixed standard.

## Tremendous Volume Handled

The concern handles approximately 6,000,000 pounds of freight a day, inbound and outbound. It operates nine depots, five outbound, three inbound, and

## Data the Buyer Wants!

It will all be found in the big issue of THE COMMERCIAL VEHICLE to be published January first, 1922.

This issue will contain specifications of motor trucks arranged in the way the buyer can best use them.

Moreover, the big issue will include a comprehensive review of motor trucking, its growth and development, its field and its future, on a broad scale.

This big issue should be on your desk the year round, for reference.

## You Can't Afford to Miss It!

the other a combination of both and located on the Illinois side of the Mississippi. One outbound depot has a capacity of 1,500,000 pounds and one inbound will hold 1,000,000.

There is no extra charge to the shipper or consignee for the movement of the freight by the Columbia Terminals Co. The railroads pay the Columbia for its service and do not make any additional charge themselves. They economize, however, by the fact that it costs them less to pay for the transfer by truck than by rail, or "trap car," as it is called.

When a truck, tractor or wagon leaves the company's stables in St. Louis in the morning, it goes direct to one of the depots for a load to be transferred to the depot of an Eastern line in East St. Louis. The vehicles cross the Eads Bridge, the approaches of which, on either side, enter into the very heart of the industrial and commercial districts of the two cities.

## Four Complete Trips Daily

If the freight is for the connecting lines it is dumped on the platform of that particular line, and the truck is reloaded with freight for St. Louis consignees or for transfer to Western lines.

No time is lost, four complete trips being made by each vehicle every day.

By using the trailers it is not necessary for the driver to wait until he receives a load. The tractors go from one depot to another, picking up loaded trailers and hauling them at once to their destinations. The trucks, of course, cannot move until loaded, although in the case of horse-drawn vehicles the same system as that employed for the trailers is used.

## Only L. C. L. Freight

No effort is made to infringe on the business of the Terminal Railroad Association, which handles the transfer of carload shipments from Eastern and Western lines, and also for local deliveries. The business of the Columbia is confined strictly to less than carload shipments.

The company has 550 men employees, including station help, drivers, chauffeurs, etc. In addition there are 100 girls employed in the offices, and six office boys. The company is capitalized at \$2,000,000. The main offices and a warehouse with 225,000 sq. ft. of floor space, are contained in a four-story brick structure in the heart of the downtown industrial and railroad district.

All of the depots, or "off track" stations, as they are called, are conveniently situated with the idea of eliminating as much as possible all lost motion. At all of these warehouses the company maintains its own forces for the handling of the freight, the unloading and loading, and the segregation into piles of freight received over different lines but billed to the same consignee.

## Operating Records Kept

A record is kept of the time a wagon or truck is dispatched, there being a special checker for this duty, the number of the wagon, the name of its driver, and all other data concerning the item being hauled and the circumstances under which it is received and transferred is carefully entered in a billing sheet, so that the warehouse or depot head, or any of the officials of the company, can readily tell where a shipment is, why it was delayed, in what condition it was when received, etc.

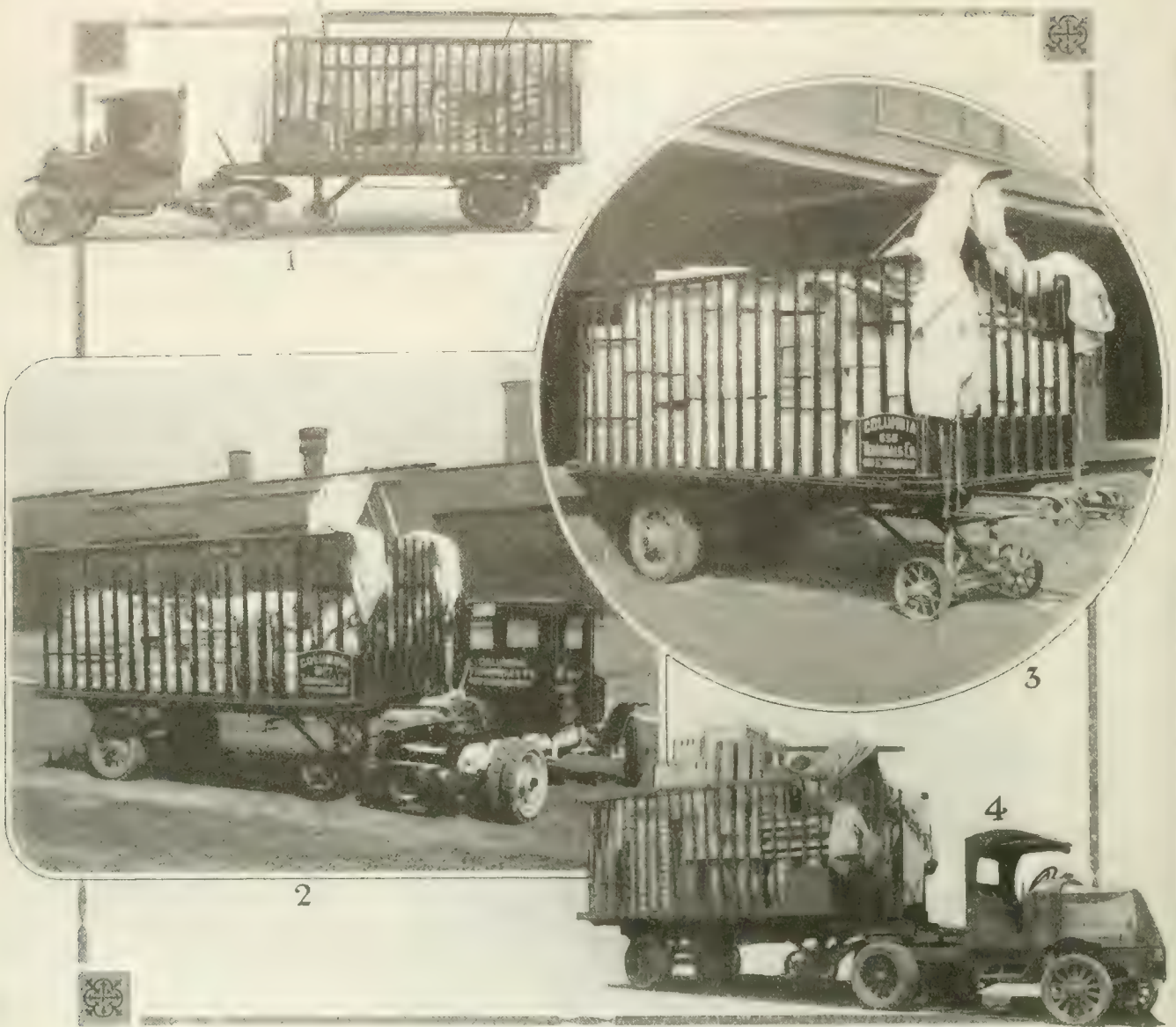
In addition, there are inspectors, checkers and supervisors on the streets. The essential thing with the officials of the company is to have freight delivered to its destination as rapidly as possible, and in good condition.

There is but little delivery of freight within the city, this constituting about 5 per cent of the total business. The company also has the baggage checking





The views above illustrate the activities of some of the equipment of the Columbia Terminals Co. in handling railroad freight in St. Louis. 1—Trucks and trailers of the Columbia Terminals Co. being unloaded at East St. Louis, Illinois railroad depot. 2—Shipment leaving one of the St. Louis depots for delivery to an Eastern line railroad in East St. Louis, Illinois. 3—Getting ready to unload a big trailer at the company's inbound depot. 4—This is the company's main office, occupying a square city block, located in the heart of the downtown railroad and industrial district. The first floor contains the warehouse. 5—A truck and a trailer at a St. Louis depot



*In the views shown above, a better idea is given of the great saving in time and labor effected by the use of trailers. While the tractor is on a trip with one of the trailers, a limited staff of loaders can be busy loading another one. Being automatic, the coupling mechanism requires only a moment. 1—A consignment from St. Louis industries to be delivered to an eastern railroad line at East St. Louis, Illinois. 2—View of a tractor and Lapeer trailer, showing the coupling mechanism. 3—In this view, the loaders are busy with a trailer, while the tractor is out with another trailer. 4—This Mack tractor and trailer have just left one of the company's warehouses with a full load*

and delivery concession in Union Station, but this, likewise, is a negligible part of the business in comparison with the hauling of in and outbound freight and the interchange between the lines.

While the use of the trailer is not exactly an innovation, the benefits of its use are beginning to be felt more each year. It is possible to load a trailer twice as heavily as any truck, and the saving in time also is a factor.

### What Trailers Have Done

Through the use of trucks and trailers the Columbia Terminals Co. handles

freight from 24 to 72 hours less than the time required in most of the other great gateways of the United States, according to J. F. Murphy, assistant general manager of the concern. He asserted that many other big cities, confronted with the same freight transportation problem as that of St. Louis, will eventually adopt the same manner of dealing with it. Many cities already are using trucks and trailers, and find them invaluable, he said.

Mr. Murphy said that the railroads consider the Columbia company really a vital link in their own businesses, it

being obvious that they can economize considerably in labor and time in the handling by truck and wagon of all less than car load freight.

He pointed out that by the end of the year the company will have in service many additional trailers, it being desired to supplant all of the horse drawn vehicles in this way. He explained that the tractor is the most costly and must be used at every opportunity so that it will pay for itself. The trailers outnumber the tractors three to one or better.

When freight is received for local consignees it is placed in warehouses and



the firm or individual to whom it is billed is notified of its arrival. He hauls it away himself. But in this way he is saved the necessity of visiting the depots of many different roads, some perhaps located on East St. Louis, to gather together all of his shipments.

The same is true for the railroads. Instead of sending cars to the various depots of each line to take the freight across the river for interchange with the connecting line, all of the freight is placed in the same truck, hauled to the various roads by the Columbia company, and in far less time than it would have taken in shipping by rail.

The company has a tariff on the same

principle as the railroads, and which contains the rates to the roads for the interchange and deliveries to St. Louis or East St. Louis depots, but no contract with the roads. L. Wade Childress is president of the Columbia Terminals. In the offices and depots of this concern they have a unique method of calling the attention of employees to the requirements of their jobs. Little verses, soliloquies, etc., are pasted on a bulletin board each day.

Mr. Childress and Mr. Murphy both expressed the opinion that the use of tractors and trailers is going to revolutionize the hauling problem in great terminals.

"Our belief is that the economies in

drayage growing out of the use of tractors and trailers will revolutionize the entire business," Mr. Childress said. "Even now, if in their calculations the railroads would take into consideration the cost of 'switch' movement involved in the handling of 'trap cars' they would find that the trap car method of handling less than carload freight is more expensive, as well as less expeditious, than the team or motor truck.

"We believe," he continued, "that the time will come when trailers will be placed at shippers' doors in cases where a straight load may be made by one shipper for one road and the expense from the shipper to freight station divided between the shipper and railroad."

## Try This on Your Bus Line!

*Drivers' Bonus Saves Repairs and Increases Patronage*

THE Depot Motor Bus Lines, Inc., of Chicago offers a monthly bonus of \$10 to the driver whose bus shows the lowest operation cost. A similar reward goes to the driver whose bus develops the most business. The results have been so good that a profit sharing plan will be introduced shortly.

According to W. T. Gridley, vice-president and general manager, the bonus system has resulted in better care of the buses and greater courtesy to the public. There has only been one personal injury case in a year and that was not the driver's fault. And in the few cases of injuries to the buses, 90 per cent of such trouble was not due to any fault on the part of the drivers.

Experience has shown that the driver's personality has a good deal to do with getting business. There is one run which makes the depots at a time when passengers are few. It shows such light

receipts that no driver is obliged to handle it more than his share of the time. Yet one driver can take this run and score as a high man 50 per cent of the days he takes it.

How does he do it? It is a matter of personal following. The patrons like him. They have confidence in his driving. He is especially thoughtful and helpful in the case of the aged and the infirm. In fact, women shoppers of the more timid sort will often allow a bus or two to go by in the hope that they can ride as his passenger.

In the matter of operating expense, the \$10 reward has resulted in careful driving and especially in lower consumption of gasoline. It is a curious fact that no driver has ever won both rewards in the same month, although this is quite permissible.

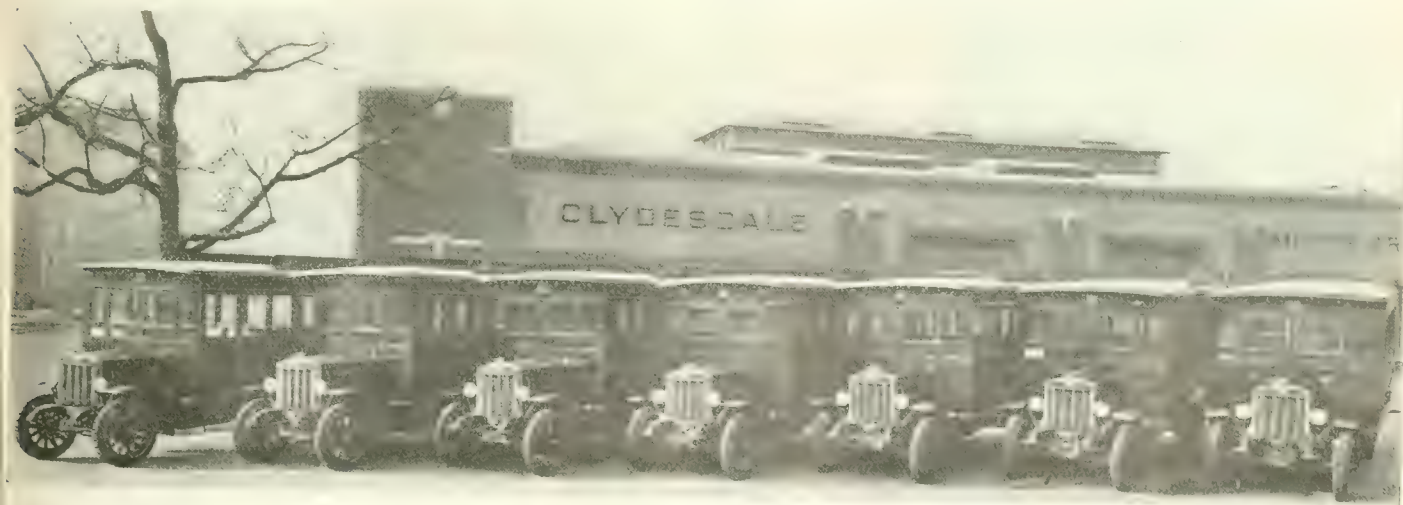
Seven buses are in operation and three more are to be added within a month.

Operation during business hours is maintained at about 3 minute intervals. The fare is 10 cents, but six tickets can be purchased for 50 cents. The cash fare is but 2 cents more than present street car rates in Chicago.

Street car service through the loop will average slower than bus traffic. Passengers on the street cars who seek to reach the same store at which the bus line deposits its patrons, must negotiate on foot the State and Madison streets corner, which is said to be the busiest and most congested crossing in the world. This is one of the big outstanding advantages on traveling by bus and the public has been quick to appreciate it all over the country.

The buses operated by the Depot Bus Lines, Inc., are mounted on 2½-ton Clydesdale chassis.

Operators of other bus lines might do well to experiment with this bonus idea.



The new fleet of the Depot Motor Bus Lines, Inc., of Chicago, drawn up for inspection. The owners and operators of this bus line have found that a bonus system involving monthly payments to the drivers has gone far to keep the buses in their first pristine beauty. It has also done much to increase the safety and comfort of the passengers

# How They Are Getting the Facts

*Views of the Test, Now in Progress, to Determine the Effect of Truck Traffic on Different Pavements*



The process of demolishing the test highway built at Pittsburg, Cal., with thirteen different sections of different types of pavement, built in the shape of a racetrack, is already begun. 1—This remarkable view was taken soon after forty trucks started out to demolish the test highway. (Twenty operated in each direction.) 2—This view shows the point where the straight-away section meets the curved section, which is super-elevated to enable trucks to travel 25 miles per hour in safety. 3—Using an extensometer to measure the expansion of the concrete. Notice the crack between the two extensometer points. 4—This is a 50-ton scale installed for weighing the trucks. 5—Taking the temperature of the concrete. 6—One of the tunnels with the registering instruments



# Motor Trucks to Handle It All!

**Plan to Motorize, Through a Terminal, All the Less Than Carload Freight of a Big Manufacturing District**

THE larger manufacturers of Buffalo and of the Niagara frontier are planning to motorize their short haul traffic. That is another big movement toward motorizing less than carload freight.

The work is in the hands of the Motor Transport Committee of the Industrial Traffic Club of the Niagara Frontier. William P. Smith is chairman of that committee. And, according to Mr. Smith, the railroads, operating in Buffalo and the vicinity, will welcome rather than oppose the change. That is the big point, to men of vision, which the project has disclosed.

## Proposed Plan

In the project which Mr. Smith and his associates are pushing toward completion, it is proposed to motorize the short haul business from Buffalo to Tonawanda, Niagara Falls, Lockport, Lackawanna, Depew, Lancaster, Dunkirk, Batavia, Rochester, Jamestown and Erie and from any one of these cities to all the others.

The plan includes the establishment in Buffalo of a centrally located terminal also, for the convenience of companies and individuals using trucks in shipping goods.

Manufacturing concerns and other shippers will be asked to send their outgoing consignments of freight to this terminal, where they will be picked up by the trucking companies and truckmen and carried to their destinations by a well-organized and comprehensive delivery system.

## Present Method Wastes Time

Under the present system, such as it is, the different trucking companies and truckmen pick up consignments to the various points by visiting the plants of manufacturing and other concerns.

This method involves a very considerable waste of time, as the trucks must of necessity move very slowly in the congested districts thus visited to reach and get away from the plants and other shipping places.

In addition, it involves a great deal of loss in the way of needless wear and tear on the vehicles in making long and circuitous runs and a greatly increased expenditure for gasoline and oil, not to mention the discomforts and inconveniences suffered by automobilists and other users of the streets owing to the presence of the trucks on the highways. Nor is this question of highway conges-

tion one which the association believes in regarding lightly.

## Terminal Saves Time

With the proposed terminal in operation, all this loss and congestion or at least a big percentage of it will be eliminated. And by saving the time which they now waste in very slow movement through congested streets in quest of



## Letter to the Buyer!

Dear Mr. Truck Buyer:

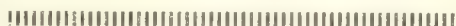
When you want to buy a new truck do you have to spend a lot of time and money getting together the necessary reliable data on which to base your final purchase?

Do you know, even then, where to find that data and how to apply it to the problem when you have found it?

And in the end, are you always satisfied with your purchase when you have made it, or do you find that you have forgotten some detail of construction that would have altered your decision?

All this data will be found in the Annual Specification Issue of THE COMMERCIAL VEHICLE, to be published January first, 1922.

## Be Sure It Is on Your Desk!



many small shipments, the trucking companies and the truckmen generally will be able to make longer runs into outlying territories, in the same time that is now required to cover their present trips.

It is expected that, under the new system, incoming freight will be delivered to consignees in the same way as at present, incoming freight presenting not nearly so difficult a problem to the truck hauler.

In formulating the terminal plan, the Industrial Traffic Club has obtained data from Rochester, Boston, Baltimore, De-

troit, Grand Rapids, Cincinnati, Louisville, Seattle and other cities where terminals, such as it is proposed to establish in Buffalo, are already in successful operation.

## Manufacturers Interested

The club has already interested the traffic managers of 150 of the larger manufacturing concerns in Buffalo and the vicinity. In addition, it has promises from ten of the biggest motor truck lines operating in the city to use the proposed terminal.

The work of educating the shippers of the western end of New York State to appreciate the desirability of the proposed change is now in progress and according to recent reports it is moving along very favorably.

The proposed terminal will be operated independently of the shippers and by a co-operative company to be made up of representatives of the different trucking companies and truckmen of Buffalo.

The Industrial Traffic Club has not and will not have any monetary interest in the association.

Mr. Smith and his associates are giving their services and their time entirely gratis in the promotion of the plan. And when all the necessary information is collected and co-ordinated, they will lay it before the trucking companies and others who use trucks in conveying freight, and will endeavor to convince them that it is to their advantage and to the good of Buffalo to support the project.

## Site Under Discussion

Three or four different sites for the terminal are under discussion at the present time. While nothing is definitely determined as yet, it is probable that the terminal will be located somewhere in the vicinity of the Terrace.

The financing of the establishment and the maintenance of the terminal remain to be worked out. But no great difficulties in this direction are expected by the promoters of the plan, owing to the mass of data already available in the experience of other terminals, organized and operated in the other cities mentioned above.

Altogether it is expected and hoped that the formation of such a terminal and the handling of freight along more definite and economical lines will do much to cut down the present cost of delivery in Buffalo and the vicinity and will be of real service to the city generally.

# Bus Development in Illinois

## *A Survey of the Development of the Bus Business in a Typical State with Some of the Problems of Bus Operators and How They Have Been Surmounted*

ANY story of to-day's motor-bus situation in Illinois is almost certain to be out of date before the copy has been set in type. Just now things in this particular field are moving with great rapidity. Furthermore, there is little in sight in that State that promises a peaceful development of this new phase in urban and interurban transportation.

Governor Small's new Commerce Commission, which takes the place of the Public Utilities Commission, has established rulings that can, if enforced, have but one effect—to drive out of business every motor-bus line in the State. Yet, regardless of the strife and confusion of the present hour, one thing appears reasonably certain: Illinois is on the threshold of a change in its transportation system—both urban and interurban—which is to be as marked as that which accompanied the introduction of the electric trolley car. The motor bus will not be legislated out of existence. It has come to stay.

### Rapid Development

The rapid development of the motor-bus "idea" in that section of the country has been due to much the same causes that have been operative elsewhere. The period through which the country has passed has been one of great difficulty for the electric lines. High operating cost has precluded in many instances the upkeep of equipment and an increase in schedules necessary to meet the needs of growing communities. In Illinois, however, the matter of highway improvement also has had considerable to do with the installation of interurban bus lines. Illinois is by no means numbered as yet among the states that are remarkable for good roads.

Still, the past five years has witnessed, all told, quite a substantial increase in concrete-surfaced highways and a considerable improvement in the way of graveling dirt roads. The influence of roads upon motor-bus operation between towns and cities is, of course, a basic factor. Large sections of Illinois must remain stranger to this form of transportation until the "gumbo" roads are replaced by gravel or concrete. It is easy to understand how it comes that motor-bus development in interurban operation has, up to the present time, shown itself only in such parts of the

State where hard roads of one sort or other have been built.

### Sixty Granted Certificates

Of the more than sixty motor-bus lines which at the present writing have been granted certificates of convenience and necessity by the Illinois Commerce Commission, approximately half of them operate either in or out of Chicago, Peoria, Bloomington, Danville, Springfield, Rockford, Alton and East St. Louis. This list comprises most, although not all, of the larger cities of the State.

In each of the above instances, hard roads are available for such interurban bus lines as find one terminal in any of the cities indicated. Not all of these interurban bus lines compete with electric service. The most of them, however, cover a territory that is served by either steam or electric lines.

The balance of the bus lines which have been granted certificates of convenience and necessity are either operating in or out of cities of secondary size where inadequate transportation offered by steam or electric lines, combined with gravel or cement highways, provide a combination which makes possible the profitable operation of motor-bus service.

The longest route covered is that between Peoria and Springfield, where the Peoria-Springfield Motor Transit Company is operating both freight and passenger service over a distance of approximately 70 miles under road conditions that are practically ideal.

Of the various cities indicated, Chicago and Rockford offer situations which, while unique in some ways, are quite typical in others, of conditions confronting motor-bus development in this State. Chicago has had motor-bus transportation on the north side since 1917, when the Chicago Motorbus Company introduced the large type bus on a route extending some nine miles along the lake shore.

This route never has offered serious competition to existing electric lines for the reason that, with the exception of Lincoln Park, it serves a section lying at some distance from the traction cars. The huge buses with their open upper decks have proved more popular in summer than at other seasons, resulting in crowded conditions at times and causing many patrons to seek the service offered by the electric lines.

The Chicago Motorbus Company has

sought, evidently, to meet this situation by introducing a bus in which the upper deck may be wholly inclosed in case of inclement weather.

However, there are those in the motor-bus field who believe that in a comparatively short time the huge buses now operating will be replaced by smaller vehicles carrying possibly twenty-five passengers. The success that is attending the use of such buses in Chicago and elsewhere seems to point to a probability of this being one of the changes likely to come.

### Some Difficulties

The operation of the north side buses in Chicago has not been without difficulties of a legal or financial nature. A receivership of this line was brought about in 1920 owing to the fact that holders of certain notes were not compensated on maturity of the paper. The north side company sought permission at one time from the Public Utilities Commission to operate buses on the south side of the city, but the issuance of a certificate of convenience and necessity was denied by the commission.

Buses have never been operated, save in a few outlying sections, either on the south or west side of Chicago. Several extensive plans have been made in the interest of south side transportation but the actual inauguration of motor buses in this section still hangs fire. At the present writing petitions are pending before the Commerce Commission.

### Whole City Not Covered

The west side, also, has yet to obtain motor-bus service, although it is claimed by those who are seeking to inaugurate motor service in this direction that it will be possible to route passengers from the loop as far west as Oak Park, a distance of ten miles, at a saving of time over either surface or elevated lines. True it is, that once free from the traffic congestion of the loop district, both Jackson and Washington boulevards offer splendid access to this great section of the city.

At the present writing, then, motor-bus transportation in Chicago is limited for the most part to the Chicago Motorbus Line along the lake shore north and a depot line carrying passengers from the Union and Northwestern stations to the center of the loop. To these should be added the service maintained between



a large hotel on the north side and the downtown section, a transfer line serving passengers between various railroad terminals and a few other short-hauls, most of them in outlying sections or the suburbs.

### Conditions in Rockford

In Rockford, a city of 70,000, the Fay Motor Bus Company operates some thirty buses which have a capacity of 20 passengers with an overload of 50 per cent. In this city the conditions have been tempestuous for some time. There has been doubt as to when the franchise of the electric company expires—some holding it having expired in 1918; others that it still runs until 1923.

The street car company threatened to suspend its service unless the Fay certificate of convenience and necessity were revoked. The Fay Company countered by offering to take over the entire transportation of the city on a six months' trial.

No further action has followed. It is believed that one company or the other is due to quit the field in time. However, the Fay Company is confident that the era of the motor bus already has dawned and that it is only a matter of time when most cities of 100,000 or less will depend wholly upon this form of transportation.

This company, it may be added, has done a great deal of experimenting with different types of buses and has come to feel that the 20-passenger bus offers the ideal equipment for city service. The cost of operation of this type bus has been found to be less than 19 cents per mile. The actual operating cost in the case of the Fay buses during August, 1921, was 18 87/100 cents per mile. The average for the 10 months was somewhat less.

### Some Legal Obstructions

No article dealing with the motor-bus situation in Illinois would be complete without some mention of the rulings of Governor Small's new Commerce Commission which takes the place of the Public Utilities Commission. Among its first acts was the issuance of "General Order No. 68" relating to "the matter of rules and regulations governing corporations operating motor vehicles." This order has been effective since July 1, 1921. Among other things it is provided that no motor vehicle shall be loaded with more than its normal weight-carrying capacity, and in no case shall passengers be allowed to ride *except* in seats provided for their accommodation."

If enforced, this order would so hamper bus operation at rush hours that few, if any, of them could serve the public to advantage. So far, the order has not been enforced, but motor-bus corporations feel that it hangs like a sword above their heads. The fact that motor buses should be singled out in the matter of overload, whereas other forms of transportation are not, has led to various speculations.

However, this is not the only hampering circumstance to be found in "General

Order No. 68." For instance, every public utility operating motor vehicle must file a *quarterly* statement of its operation costs, income, assets and liabilities together with a *quarterly* statement of evidence that it has complied with the commission's requirement as to the deposit of securities or other indemnifying bonds to cover the payment of damages due to the operation of its vehicles.

Other public utility corporations engaged in transportation are required to

population of 100,000, served notice upon the public to come into court on a specified date and show cause why street-car service longer should be continued in these cities and towns. The reason? There is a limit even to which a public service corporation can go on losing money. In this particular field, however, motor-bus lines have not been a factor in bringing this situation to pass. High operating costs, heavy taxation by communities, the increased use of automobiles, etc., have



*Elsewhere on this page are given some interesting facts on the growth of the Fay Motor Bus Co., Rockford, Ill. Above are two views, inside and out, of one of the buses with which the Fay company has already established a reputation for good service with the public. The arrangement of seats is unusual*

handle similar matters annually—not quarterly. In fact, "General Order No. 68," if enforced in each and every detail, will make the operation of motor buses exceedingly difficult. An organization, known as the Association of Motor Transportation Companies of Illinois, has been formed to meet and handle problems such as are presented by this "order."

### A Glimpse Ahead

It is the belief of many men who are in close touch with development in the motor vehicle field that the next ten years, if not less, will witness an almost revolutionary change in urban and interurban transportation in Illinois. A few days prior to the writing of these paragraphs a judge in that State who is in charge of an electric system operating in a chain of communities having a

combined to cause the lines to lose money.

*The old order passeth and giveth place to new.* With the increase of surfaced highways, interurban passenger transportation is due to go forward by leaps and bounds. Standardization of motor-bus equipment along lines of proved economical operating expense must hasten developments in both the urban and interurban fields.

Possibly it is just a coincidence that Illinois is on the verge of a great road-building campaign and that various lines engaged in electric transportation are suffering from the stress of war and post-war conditions. On the other hand, it may be that these are but stage settings—preparations for the new order and a means toward hastening the change that appears to be imminent in the transportation of this country.

## An Interesting Exposition of Costs, Prices and Competition in the Field of Truck Haulage, Answering Two Questions of Vital Importance to All Commercial Haulers

To get at the bottom of the problem of haulage prices a customary basis for making truck charges must be considered. In all the larger cities in the country and in a great many of the smaller ones cartage charges are computed on the tonnage basis. This is



true of all freight save textiles, where the charge is based on the per case rate. The average charge on this type of freight largely depends on zones and fluctuates between 40 cents a case and \$1.50 a case. All freight carried by express, however, is at the per package rate.

The reason for the per case charge on textiles is obvious. Generally speaking, their weight and size varies more than any other kind of freight. If the truckman were to charge on the gross weight basis, it would be an open door to continuous disputes between him and the shipper as to whether case number so and so was heavy or light or large or small.

Such a procedure would require the services of a staff of experienced bookkeepers to keep accurate figures on the weight of the freight hauled. Consequently the per case basis is used, being a blanket rate for large or small cases. By this method the hauler stands to lose on the large cases and make an excessive profit on the small ones, which pretty well evens up the profit and loss on the total.

### Tonnage Basis More Usual

Aside from the textiles, about 90 per cent of all other freight is handled on the tonnage basis. Where there is no volume quoted, a minimum charge is made which is slightly below the per case rates for textiles. Only about 10 per cent of all freight hauled by motor trucks is charged for on the basis of the number of cases handled, regardless of size and weight.

In New York City, where, because of the present keen competition, prices have receded to almost pre-war prices, the average gross weight charge is as follows:

Average below Fourteenth Street .....	10c per cwt.
Fourteenth Street to Thirty-fourth Street .....	12c per cwt.
Thirty-fourth Street to Fifty-ninth Street .....	15c per cwt.
Fifty-ninth Street to One Hundred and Twenty-fifth Street .....	18c per cwt.

The reason for the lower charge below Fourteenth Street is because the majority of the railroad piers are in this zone and so are the majority of the truckmen.

While the foregoing are average rates, it must be borne in mind that many merchants, with offices in New York City, are getting their freight moved for less money because of the reigning price war already mentioned.

### How Charges Are Computed

As to the methods used by truckmen in computing cartage charges, this information or some phases of it is contained in the literature of the organizations advocating the installation of truck cost systems. At the same time it might be well to summarize briefly the various items of operating expense

which in the final analysis form the basis for all cartage charges.

The first and most important item is the driver's wage. Under the terms of a recent contract made between the locals of the International Brotherhood of Teamsters and the Merchant Truckmen's Bureau of New York, an employers' organization in New York City, drivers are paid a sliding scale of wages which runs from \$29 a week for a



*James J. Riordan, president of the United States Trucking Corporation, the largest trucking corporation in the world. Mr. Riordan's views on the cost and prices of truck haulage in different parts of the country are set forth in this article. They should prove of interest to all business men engaged in truck haulage*

single horse truck to \$35 a week for a 4-horse truck. The motor truck driver's wages are graduated as follows:

1-ton truck .....	\$31
2-ton truck .....	\$32
3-ton truck .....	\$33
4-ton truck .....	\$34

These wages are for a six-day week and a 9-hour day. Helpers on trucks are paid at the rate of \$27 a week and overtime is paid at the rate of \$1 per hour. The present wage contract does not expire until August 1, 1922.

### Loading Time Is Big Item

The second item to be considered is the cost of loading. The hauler must pay the loading charges out of the amount received from the merchant for hauling his goods. Under the terms of another contract made between the truckmen's bureau in New York City and the International Longshoremen's Association on March 1, 1922, the fol-

lowing loading scale was agreed upon for one year:

Loading from platforms of warehouses .....	1½c per cwt.
Loading from docks, piers, cars or sidewalks.....	2½c per cwt.
Loading of rags, toys, dolls, hides of all kinds, bar steel in cases or loose bar steel.....	3½c per cwt.

It might be assumed that these rates, having been agreed upon, would be generally lived up to by the loaders, inasmuch as the contract was signed for them by their leaders. The only possible answer to this is, "Try and get them!"

The loaders now charge exactly what they like, or, to be exact, what they can get. This has its effect on prices, inasmuch as truckmen, figuring cartage charges on the basis of the above mentioned loading scale, frequently lose money on the prices they quoted the merchant for the haulage, when they are overcharged for loading. To make matters worse, no redress seems possible and the merchant is unwilling to share the extra loading expense with the truckman.

### No Redress in Sight

The union leaders, in answer to complaints, say that they tell their men to live up to the loading contract and that is all they can do. The railroad and steamship companies wash their hands of the matter entirely, saying that the loaders are in the employ of the truckman and are permitted on the company's property merely as a convenience to truckmen. The Interstate Commerce Commission takes no interest in the matter, stating that there is no law on the statute books which serves to exercise even a minimum control over loaders and the prices they charge. Local governing bodies refuse to take up the proposition and the loaders pursue the even tenor of their ways.

Next in order of importance come maintenance of the equipment, truly no small item; stable charges for horses on horse-drawn equipment, not forgetting ferry charges, and, last but not least, the premium on liability and compensation insurance, together with overhead expenses, such as clerical help, foreman, runner, office rent and light and telephone charges. Add to this the aforementioned traffic congestion in the larger cities and finally, in very small figures, "a fair margin of profit." There are also, of course, other items, such as depreciation, interest on the investment, gasoline, oil, etc.

### "A Fair Margin of Profit"

As to the fair margin of profit, the average truckman in New York to-day will tell you that "there ain't no such animal." Haulers are fighting for their business lives, optimistically waiting for the time when the "back to normalcy" bud will bloom.

In view of this situation the lighter-age interests are on their toes in an



effort to convince merchants of the advantages of lighterage over trucking, at the same time quoting prices that are so low as to make it economically impossible for the truckman to compete with them for certain kinds of work.

Analyzing this situation shows that a large factor in their ability to do this is the loading charges. The lighterage companies hire longshoremen on piers to load freight on to their lighters for 65 cents an hour and sometimes less. As against this, the truckman must pay a much higher rate for having his freight placed on the tail of his truck.

The difference in prices for loading seems to be a matter of location. That is to say, the truckmen's loaders work in the center of the dock, while the lighterage loaders work near the edge. On the other hand it would not be practical or remunerative for the truck loaders to work on an hourly basis unless they were paid by the steamship or railroad companies, for the reason that hundreds of different truckmen come to each dock for freight, varying in quantity from a single case up to ten tons.

### To Solve the Problem

The obvious answer to this problem, it would seem, is for the steamship and railroad companies to take over the work of loading on their own property and thus exercise control over the loaders, establishing a workable and efficient system and setting up standardized, non-fluctuating prices.

Any such suggestion, however, is usually regarded as rank heresy. The general attitude seems to be that the companies have enough trouble now and that any attempt to inveigle them into additional strife and discomfort will be put down with an uncompromising hand. However, the time is coming when they will be forced to exercise this control for their own protection and for the protection of their shippers.

Proceeding to cartage prices in other cities it is not surprising to note that haulers are getting better rates for their work in Detroit, the Middle West and California than our truckmen in New York. The explanation for this is that competition is not so keen in those other cities; there are fewer men in the business; and, in certain municipalities, a cartage tariff has been made effective through truckmen's associations, which forestalls ruinous competition.

In doing this, however, care is of course taken not to run counter to statutes which have to do with price fixing in restraint of trade. This is made possible by haulers rigidly observing cost systems as regards city delivery zones and adding to this operating cost a percentage profit agreed upon.

### Other Cities Suffer

Chicago, Philadelphia, Boston and Baltimore, on the other hand, are in the same boat as New York, in the matter of low rates, identical conditions prevailing in these cities. Chicago, however, has a little the better of New York in

the matter of wages. This is by reason of the new wage contract made between the Cartage Exchange of Chicago and the labor union which became effective Oct. 28.

This contract calls for a wage scale of \$28 a week for truck and team drivers, a \$3 decrease on the scale in effect last year. The reduction was accepted voluntarily by the men.

In California, the State Draymen's Association, following an investigation

### Do You Want Extra Copies?

The Annual Specification Issue of THE COMMERCIAL VEHICLE will be published on January first, 1922.

This issue will contain truck and trailer specifications, arranged in a manner which should prove most convenient for the use of the buyer. And the specifications will contain all the information the buyer wants.

There will also be a survey of the field of automotive transportation on a scale which should make it an essential reference to all business men in the field.

And there will be many other features of interest to the buyer and the operator.

If you want extra copies of this issue, be sure to apply for them well in advance.

### Keep It on Your Desk!

into the possibilities of a haulage tariff, announces that it is advisable to insert the following paragraph in the fore part of the tariff, the same being taken from within the purview of the Cartright Act:

"The prices herein were ascertained from carefully kept records of the cost of doing business and are recommended as low as can safely be charged."

In connection with cartage prices in cities of the third and fourth class, investigation has found them to be at least 20 per cent lower than those in effect in the larger cities. On this point, James J. Riordan, president of the U. S. Trucking Corp., has this to say:

### Cheaper in Smaller Cities

"It is no mystery why cartage prices are lower in the smaller cities. In the first place, drivers in these cities are generally not as well organized as they are in New York, Chicago, Philadelphia, Pittsburgh and Boston. In New York, for example, trucking labor is organized up to the hilt. Further, in many cities the 'open shop' plan is in effect. The 'open shop' plan means less money for drivers, in the long run. Less money for drivers means cheaper operating expense and this means cheaper rates.

"Again, truckmen in the smaller cities, in addition to the labor angle, have not the high operating expenses and overhead charges manifested in the bigger cities. Loading charges are less. In fact, in some cities drivers load and un-

load trucks without even a helper. You cannot do this in New York unless you pay a helper \$27 a week and even then it is doubtful whether the loaders will permit you to unload your own trucks with your own helper on the piers.

### Traffic Conditions Important

"Traffic conditions also play an important part in the cheaper rates, as does truck congestion at piers and terminals. If, in the smaller cities, a hauler can make three or four loads a day with a single truck, he can well afford to reduce his rates. In New York City if a hauler makes two loads a day he has cause to congratulate himself on the ingenuity, combativeness and efficiency of his drivers. Sometimes he is lucky if he makes one load a day. I know of many instances where trucks have been forced to wait in line at New York City piers from 1 to 6 hours before being unloaded. One load a day for a truck means a deficit for the truckman and a poor service for the merchant. I have heard truckmen say that they would rather be in the trucking business in any other city in the United States than New York."

### Is It Store Door Delivery?

The statements made by Mr. Riordan, whose corporation operates 1080 motor trucks and owns 1518 horses, are unfortunately too true. It is a moot question whether trucking as an industry can be brought back to the profitable estate it enjoyed during the war. This, apparently, can only be accomplished by regulation of reckless competition, readjustment of the wages paid labor, fewer and better truckmen in the business, and a better understanding of trucking problems by the shippers themselves.

As to the congestion and slow movement of freight in New York City, what is the remedy? Will it not eventually prove to be store door delivery?

### Mutual Truck Sale Dec. 22

SULLIVAN, IND., Dec. 2.—The Mutual Truck Co.'s plant and equipment at Sullivan, will be offered at public sale by the receiver, Dec. 22. The sale will include twelve acres of land with siding to the C. & E. I. and Illinois Central railroads; a large, modern brick building with steel truss roof; heating plant, machine tools, drawings, blue prints and a miscellaneous stock of materials and parts for building a 2½-ton motor truck. The First National Bank, Sullivan, Indiana, is the receiver and E. D. Maple the trust officer in charge.

### Trolley Co. Extends Bus Service

HARTFORD, CONN., Dec. 2.—The Connecticut Co. which operates the trolleys in this city has installed another bus line through Maple Avenue running from the Cedar Hill terminus to South Green. This is the second bus line put on by the company which runs over a route formerly traveled by independent buses which can no longer do business in Hartford since they compete with the common carriers.



# Do You Carry Your Share?

By  
Sinclair Gluck



OLD Silas Gunther, president of the big commercial house, bent over the papers before him with a frowning face. The old man's employes called him, affectionately, Old Hammerhead, because of his well-known gift for hitting the nail on the head in his frequent talks with them. But judging by his expression this morning, if the old man was looking for a nail to hit he could not find it.

The door of the president's private office opened and Ross the garage superintendent entered and approached the old man's desk in a hesitating way. Old Hammerhead was still frowning as he looked up, but the frown cleared away at once and left him as genial and smiling as usual.

"Well, Ross, what can I do for you?" he inquired.

Ross hesitated. "I hate to bother you with a thing like this, sir, just at this time, for I can see you're busy and worried. But—"

Old Hammerhead laughed. "I'm busy, Ross, but I'm not worried," answered the old man. "I don't believe in worrying. If something is wrong and you can fix it, why it's better to fix it than to worry over it. And if something is wrong and you can't fix it, why, forget it. Worrying about it won't do any good. But what is it you want to see me about?"

"Well, Garth asked me yesterday to see about getting a raise for him. I told him that I'd see him to-night when he came in and talk it over with him. I didn't say either yes or no. But I was pretty sure that you wouldn't feel like giving him or anyone else a raise at this time. I guess we'd all like a raise but we aren't any of us asking for one just now," Ross hesitated. "Of course, he hasn't had one since he's been with us."

Old Hammerhead laughed. "It isn't that I don't feel like giving you all a raise, Ross. You know that. The fact is that it can't be done just now. How long has Garth been with us?"

"About eleven months, sir."

"Humph," said Old Hammerhead. "Not a year yet. What's he getting?"

"Thirty-eight dollars a week."

"That's a living wage. Is he married? Do you think he really needs more money?"

"No, he's not married. I don't believe he's in any very great need of it."

Old Hammerhead leaned back in his chair. "Well then I don't believe we can give it to him, Ross. The business really can't do it just now anyway, but I'd be willing to help him out personally if he needed it."

Ross shook his head. "I don't believe that is necessary."

"Well, then, Ross, I think his request just now is a little unreasonable, although he may not realize it, and I think you ought to tell him so." Old Hammerhead paused, smiling. "Although you don't have to knock him down to do it, Ross."

Ross laughed. "All right, I won't."

"I think I'd put it to him in this way, which is the best way because it is the truth," the old man went on. "He knows, or he ought to know, the business is pretty bad, these days, for everybody. It's improving a little, Ross, and I think it won't be long now before things get into better shape. But the fact remains that it's bad now. The buyers' strike isn't by any means broken yet and you know what that means."

"Now a lot of employes, of whom he may be one, seem to have the idea that they should get their desserts regardless of what business conditions may be. They argue that if the business they work for is a big and sound one, it ought to be able to take care of its employes regardless of business conditions and not shift the burden onto the employes' shoulders."

"That's all wrong, Ross. If all employes got a fixed scale of wages all the time, there might be something in it. But they don't. When business is good, employes get bigger wages. And when business is bad, they must be content to shoulder their share of the bad times. For believe me, the men higher up have to shoulder their share."

"But the thing goes deeper than that, Ross. Business is not, or should not be, a cold blooded arrangement between em-

ployer and employe, under which the employe gives so much work for so much money and that's all there is to it.

"It can't be so, for the future of the employe depends on the success of the business, so that he is vitally concerned in the success of the business ultimately as well as in the present receipt of his salary."

"No, business within an organization is not a soulless affair. It is a well-organized body of men, cooperating toward a certain goal, with a mutual interest and a mutual vision. And when the pinch comes, this cooperative body of men must be prepared to shoulder the load among them, just as they shoulder the work—and just as they share in the increased returns of better times and ultimate success."

"And remember, Ross, that it is to the ultimate advantage of the employe that it is so. There are a few businesses still left in which a man is shown little consideration as an individual. If he falls down he is discharged and when he has outworn his usefulness he is discharged without a pension. But this business is not one of those. Bring that home to him, Ross."

"And last, but not least, bring this home to him. I could have filled his place twenty times for considerably less money during the last week and filled it with a man just as efficient and just as promising. But I didn't do it, Ross, because I feel that I have a duty to my employes, too. They are part of my business family and I would no more turn them away, because I was hard up and take another man on for less, than I would turn my son away from my house and take in another young fellow who wouldn't touch me for a check quite so often. Of course, I'd turn either the one or the other away if he did something outrageous. But I'd hesitate a long time at that, in either case."

"No, there is a duty on both sides. I'm doing my duty by him in not turning him away now, or reducing his salary. He's got to do his duty by me. Ask him, 'How about a little reciprocity?' Ross. It's the foundation of democracy."

# The Better Way

## To Save Time in Truck Repair and Maintenance

### No. 647—Repairing a Cylinder Head Gasket

WHEN a new gasket is not available, a broken or burned one can be repaired temporarily by cutting out a V-shaped notch, cutting a piece from another old gasket to fit in and shellacking it to place, as shown in the accompanying illustration. This is a temporary repair but should give satisfactory service for some time. Its biggest asset, however, is that it is a time saver and may come in handy at some time when a truck is needed during a rush period.—L. K. BUSSEY, Boons Mill, Va.

### No. 648—Autocar Rear Fly-wheel Puller

ALL rear flywheels on 2-ton Autocars are tapped with  $\frac{3}{4}$ -in. thread. As a result of this, it is possible to make use of the accompanying flywheel puller without being forced to go to the time and trouble of tapping holes in the flywheel to permit the use of the puller.

The two bolts that screw into the tapped holes in the flywheel are  $\frac{3}{4}$  by  $2\frac{1}{2}$ -in. S. A. E. bolts made of 1-in. square machine steel.

Before the puller body is bolted to the flywheel, it is necessary to first give protection to the end of the crankshaft. This is done by inserting a  $\frac{3}{4}$  by  $\frac{1}{4}$ -in. brass disk in a plug,  $1\frac{3}{4}$  in. round by  $1\frac{3}{4}$  in. long by  $1\frac{1}{2}$  in. deep with a  $\frac{3}{4}$ -in. hole. The plug and brass disk in it are then fitted over the end of the crankshaft, as shown in the accompanying illustration. It might be said here that the puller body is made of 6-in. round C. T. S. It is tapped to permit the insertion of the 1-in. screw. The latter is  $5\frac{1}{2}$  in. long and is made of  $1\frac{1}{4}$  in. square machine steel.

After this screw has been inserted, it is manifest that pressure brought to bear by turning this screw against the crankshaft end will force the flywheel off.—READER, Pittsburgh.

### No. 649—Acetylene Headlight for Shop Lighting

BY taking an acetylene gas headlight and fastening an electric light socket in it, it is possible to make good use of this in the repairshop or around the garage proper for lighting purposes. Of course the lamp should be kept off

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

the floor. Therefore a movable bracket should first be constructed somewhat along the lines shown in the accompanying illustration.

Mounting the lamp on this bracket permits placing the lamp most anywhere providing sufficient length of wire is used. The electric bulb of 75-Watt power will practically give daylight.—CHARLES BOEHME, Gobel's Garage, Brooklyn, N. Y.

### No. 650—Making Smooth Gasket Bolt Holes

IN making gaskets, the small bolt holes are hard to cut out and usually rough when finished. To make a smooth hole and gasket, clamp a board to the material and piece the gasket is to be made for. Then use a breast drill to drill through the piece into the material and wood.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.

### No. 651—Trouble Lamp Suspension

A TROUBLE lamp is suspended on a number of porcelain knobs which are strung on a rod across a wash rack

or other point where the trouble lamp is used. The knob slips easily on the rod and the cable is kept off the floor.—C. E. FONDA, Eugene, Ore.

### No. 652—Removing Heavy Truck Wheels

THE object of this device is to enable the workman to apply a heavy type of rear truck wheel much easier and quicker than he has been able to do with the older methods of using a greased tin, pinch bars and the like.

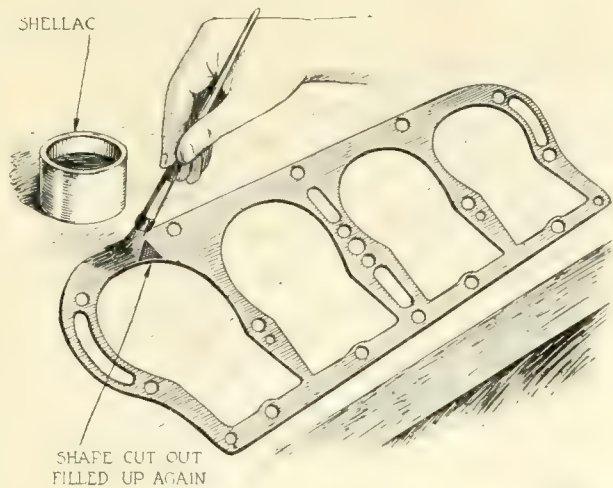
The device should be constructed from two pieces of good grade tough machine steel similar to that used in the making of crowbars. The bars should be long enough to be formed as shown and drilled permitting two steel rollers to be inserted. A pair of discarded engine valve lift tappet rollers and pins will serve. The bars should be spaced far enough apart to just clear the rubber tire on the largest wheel to be mounted and re-enforced with a safety prop as shown.

The method of wheel application with this appliance is simplified as follows: The wheel to be mounted is placed directly in front of the axle spindle, then the axle should be jacked up or down until its center is as near the center of the wheel hub as possible. Next push the device astride the wheel until the rollers have just passed the inside tire. Then the handle is raised until the entire weight is on the rollers. The appliance can then be rolled forward until the wheel is on the axle far enough to catch the thread with the wheel nut, which can be tightened until the wheel is on full. The rest of the operation is the same, applying washers, cotter pinning the nut, etc. With this device there is no possible chance of the wheel getting away and falling, resulting in injury to the workman.—G. A. LEXANDER, Belmont, Mass.

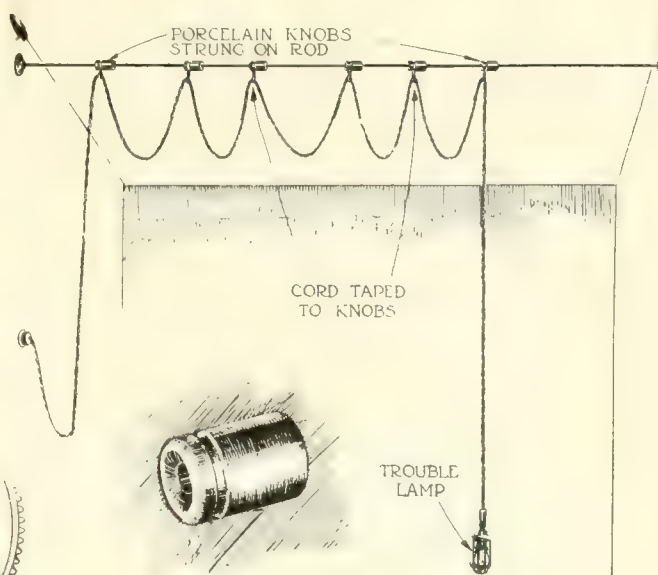
### No. 653—Puller for Roller Bearing

THE puller is made from two strips hooked at the end to get in back of the bearing. After the hooks are pushed in, a bushing forces them out behind the bearing and the screw jack on the front pulls the bearing out.—R. BEICHLIN, Bushnell, Pa.

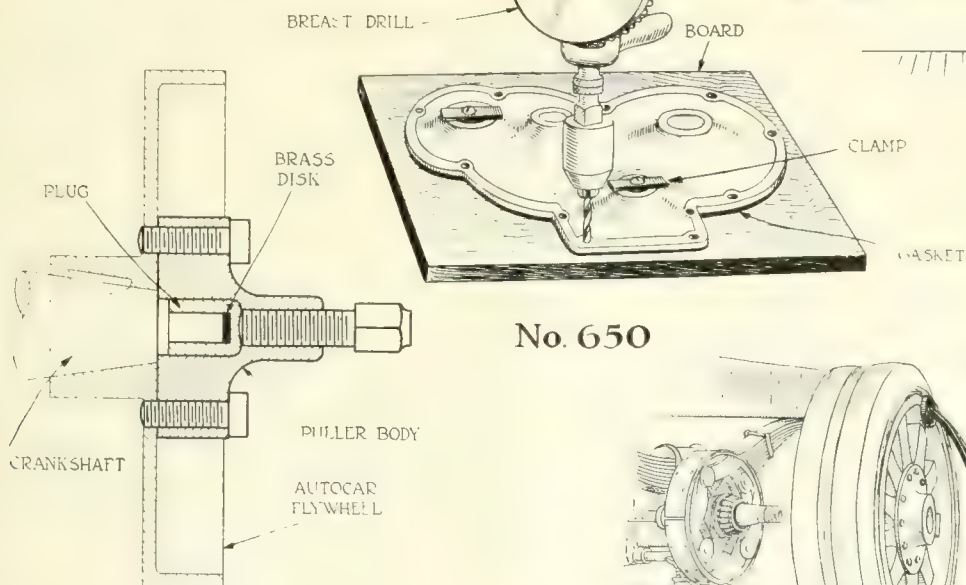




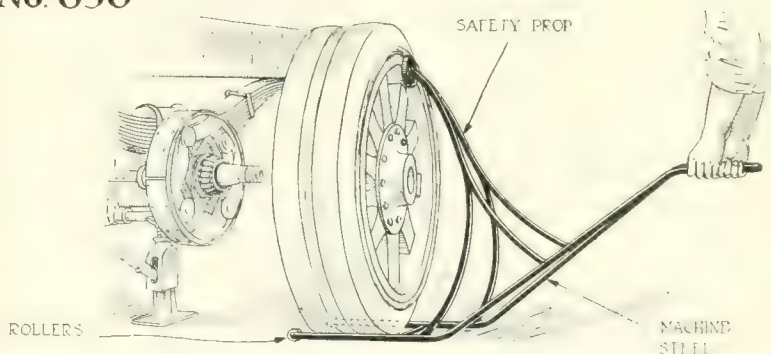
No. 647



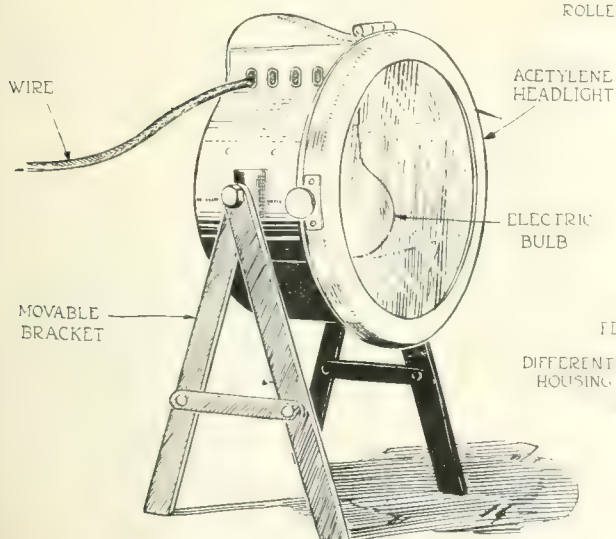
No. 651



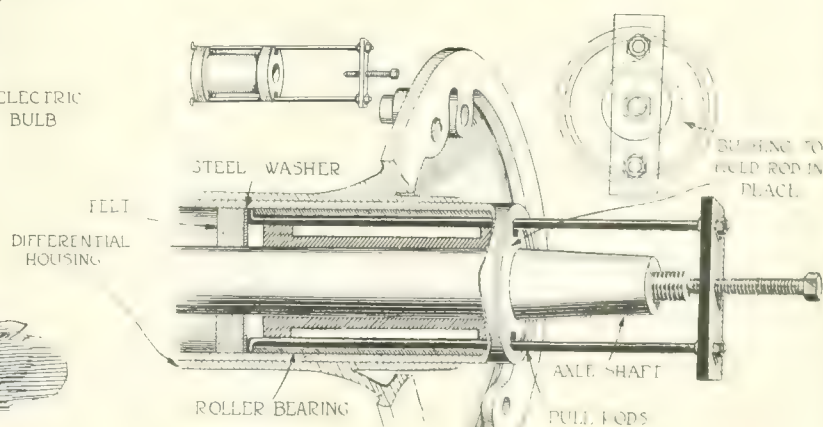
No. 650



No. 652



No. 649



No. 653

### No. 654—Shop Hoist for Truck Bodies

**R**EMOVING and mounting a heavy truck body from the chassis is not always the easiest thing to perform. The idea brought out in the accompanying illustration is a good one for this work. The whole outfit consists of two 4 by 6 in. by 8 ft. oak beams, a ½-ton chain fall and three pulleys. Four-ton hoisting wire cable is used. As shown in the sketch, the cable wire from the body cradle is joined with that of the chain fall, giving sufficient leverage to enable easy hoisting. The hoisting arrangement can be changed to suit the particular shop conditions.—R. D. PEEBLES, Bridgeport, Conn.

### No. 655—Oiling Inaccessible Places

**M**UCH time and labor is wasted daily in getting at inaccessible places around the truck during the oiling period. When it is impossible to conveniently use an oil can, it is a good idea to take a piece of copper tubing, using it for an extension, as shown in the accompanying illustration.—WALTER F. DAASCH, Mueller Lumber Co., Davenport, Iowa.

### No. 656—Wooden Cylinder Protector

**W**HEN a cylinder head is removed there is danger of carbon particles and other undesirable foreign matter dropping into the waterjackets. To prevent this, careful repairmen are beginning to use various means for covering or closing the holes. Some use wooden pegs, but a better method is to employ a wooden board about ½ in. thick. This board is roughly cut away to give access to the combustion chamber openings and holes must be drilled to allow the cylinder studs to pass through.

When this is put in place it closes up the waterjacket spaces and any stud holes which are open. A still better method is to take an old gasket designed for the particular engine in hand, and solder sheet metal over the waterjacket openings. Obviously, the advantage in using a gasket is that it is cut to fit, takes up little space and is easy to handle.—READER, Chicago.

### No. 657—Cleaning Threads of a Bolt

**B**Y cutting places in the nut, as shown in the accompanying illustration, the threads of a shaft or bolt can be cleaned. This method removes the dirt between the threads.—HERMAN RATHJENS, Gobel's Garage, Brooklyn, N. Y.

### No. 658—Tool Etiquette in Shop

**N**OT one man in twenty handles a monkeywrench as he should for effectiveness; there is a right and a wrong way, as shown.

To be sure, there is a tendency to

spread the jaws of the wrench whichever way it is used, but in A this tendency is minimized, the greater part of the strain coming at the back end of the jaws, where they are sustained by the frame of the wrench. In B, however, the tendency is to spread the jaws, and instead of holding the nut firmly the jaws are opened, strained and permitted to slip over the edges of the nut and "round" them so it will be almost impossible to turn the nut with any sort of a wrench unless it is one of the pipe variety.

The way a Stillson wrench should be used is the exact way a monkeywrench should be treated. In the case of a Stillson, it would be inoperative if attempted as shown at B, whereas it will hold if turned as at A. Try a pipe wrench and see how it will and will not work, and then apply this practice with the monkeywrench.—R. WOOD, Newark, N. J.

### No. 659—Valve Work on Drill Press

**T**HIS is a very satisfactory way to correct worn valves when a lathe is not handy. The use of a drill press in this case lends itself as a time saver



### Stop and Read This!

The Annual Specification Number of **THE COMMERCIAL VEHICLE** will be published on January first, 1922.

It will contain the specifications a buyer needs, and all he needs, arranged in an interesting and convenient way.

It will contain a review of the industry, from the operators' angle, on a scale never before attempted and many other interesting features.

### Watch Out for It!



and it will be found that the operation is simple and satisfactory.

As shown in the accompanying illustration, the valve stem is fitted in the chuck of the drill press. A nail in a board setting on the dress table acts as a center for the valve.—CLARENCE G. STONER, Coca Cola Co., Harrisburg, Pa.

### No. 660—Increasing Life of Felt Washers

**A**PIECE of spring wire placed in a felt washer keeps the felt tight against the shaft as the felt wears.—S. E. GIBBS, Corydon, Iowa.

### No. 661—Piston Rings for Scraping Bearings

**A**CONNECTING rod bearing can be scraped very successfully by using old piston rings. In this manner, it is

not necessary to go to the trouble of using a special scraping tool and sharpening it each time it becomes dull. When the piston ring becomes dull, it can be thrown away and another be used to replace it.—CHARLES BOEHME, Gobel's Garage, Brooklyn, N. Y.

### Electric Truck Future Discussed

**NEW YORK CITY, Dec. 3.**—Speakers at a meeting of the New York Electric Truck Association last night predicted a glorious future for the electric truck, and declared proper merchandising methods would soon place it in an impregnable position for city delivery work. W. H. Onkin, Jr., editor of *The Electrical World*, declared the gasoline truck for city transportation would soon lose its prestige if the public could be made to see the claimed advantages accruing from use of the electric vehicle.

The idea prevailed at the meeting that gasoline trucks are popular merely because the public has been taught to use them. Various large concerns in different cities that are using electrics for their delivery purposes testified, in letters read at the meeting, as to the efficiency and economy of operation of the electric.

No attempt was made to compare the electric truck with the gasoline vehicle for long hauls, it being generally conceded that the latter was suitable for this class of work.

An optimistic note was also sounded by H. S. Baldwin of the General Electric Co. who drew a comparison of the gasoline and electric trucks for city work. He entered into a technical discussion of the various mechanical features of the electric, and said he believed a plan adopted in Hartford, Conn., of renting storage batteries to buyers of electric trucks was a good one. Under this plan the owner of a truck does not purchase batteries with the vehicle, but merely rents them as his needs may require.

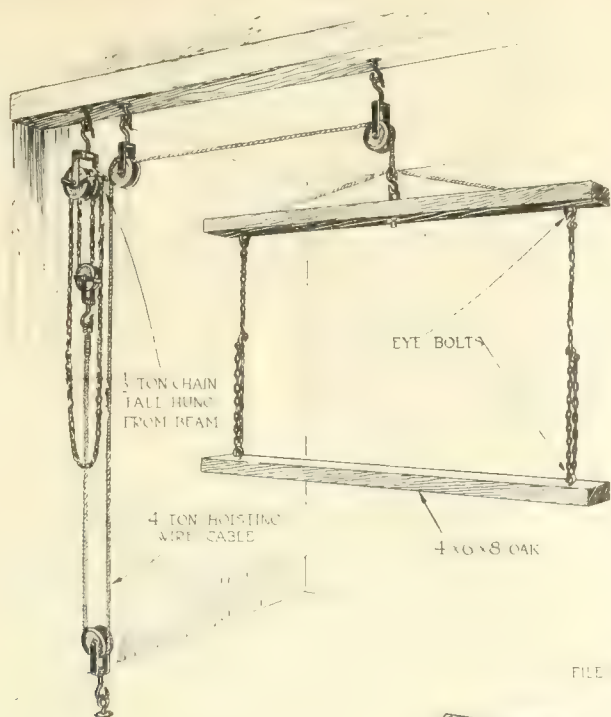
Mr. Baldwin expressed an opinion somewhat contrary to the one prevailing among engineers when he said he was not a believer in too much standardization. His objection was that it destroys individuality and competition.

### Dort Adds Commercial Car to Line

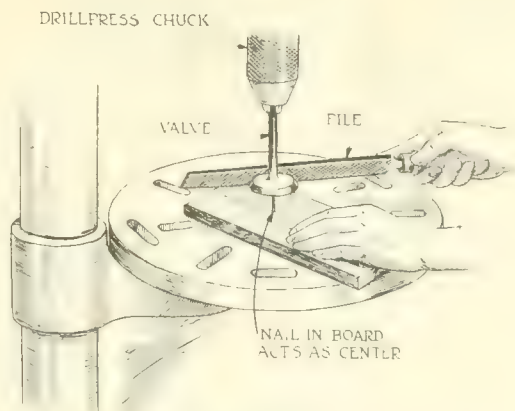
**FLINT, Dec. 3.**—The Dort Motor Car Co. has added a commercial car to its line, the same to be placed on the passenger car chassis with heavier springs.

The new model is built to carry 1,000 lb. and is offered as a chassis with lamps, lamp brackets, front fenders, running boards, radiator, hood, windshield, seat frame, cowl board and body to rear of front seat at \$685; with driver's cab and curtains added, \$715; with cab, curtains and all-steel express body, \$780, and with cab, curtains, express body and canopy top at \$825, all f.o.b. factory, Flint, Mich.

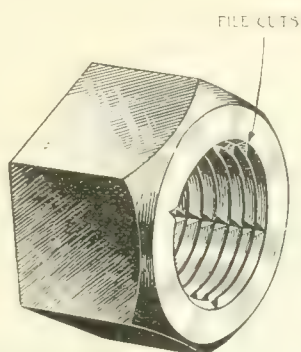




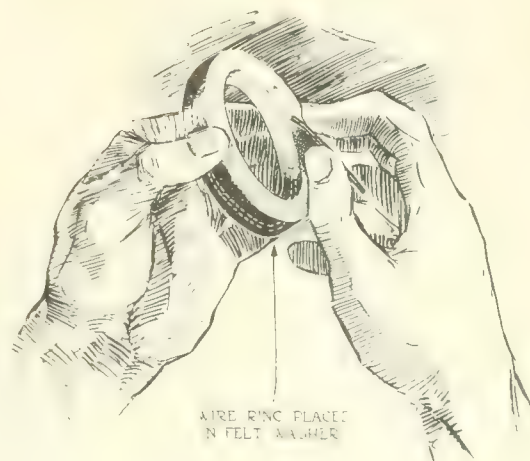
No. 654



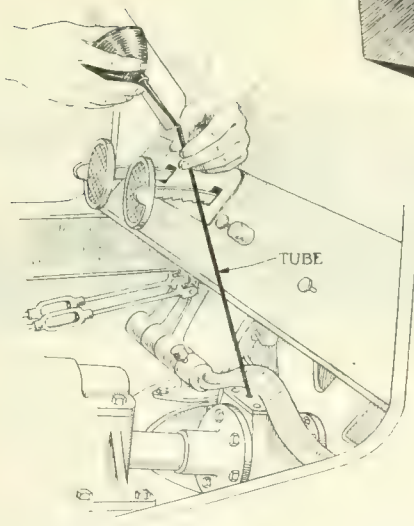
No. 659



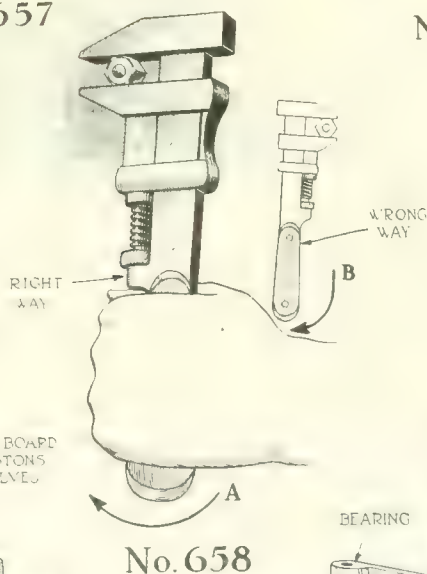
No. 657



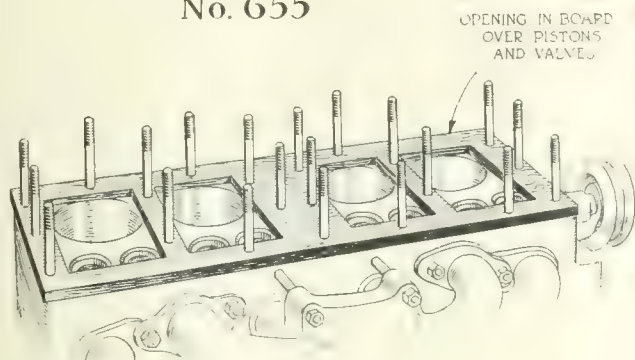
No. 660



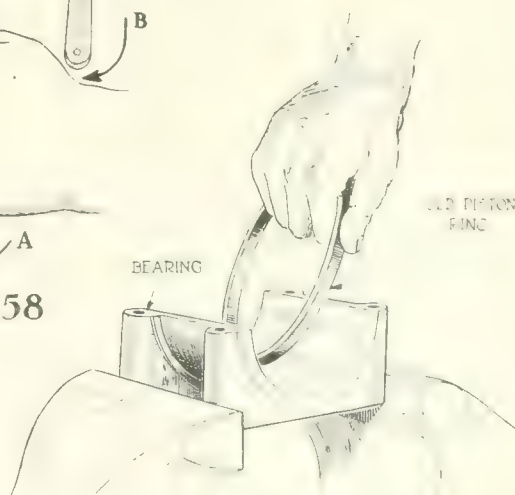
No. 655



No. 658



No. 656



No. 661

## Buyer's Department of The Commercial Vehicle

# New Method of Control on Electric Truck

**O. B. Trucks in 1, 2, 3½ and 5-Ton Capacities—Roller Chain Drive Used**

A NEW method of control which permits of very gradual starting, and of speed variation by imperceptible steps has been brought out by O. B. Electric Vehicles, Inc., Long Island City. The firm will manufacture a complete line of trucks. All of the four models (1, 2, 3½ and 5 tons) are designed along the same lines. These trucks are equipped with a single G.E. motor which drives through a silent chain running in oil, to a countershaft or differential shaft, from the ends of which the power is transmitted to the rear wheels by roller chains in the usual manner. The frame is made of rolled steel channels with the open side outward, which permits of securing brackets and other fittings to the inside with comparative ease. The spring hangers, which are riveted in place, are developed in the form of frame corner pieces. The two side rails have their ends bent at right angles so as to form one-half of each end cross member, and they are joined together by fishplates inside and out, and rivets. The main frame members thus are identical in form and therefore interchangeable. This principle of making parts on the right and left hand sides of the truck exactly alike and interchangeable has been followed throughout the design, and materially simplifies the service problem.

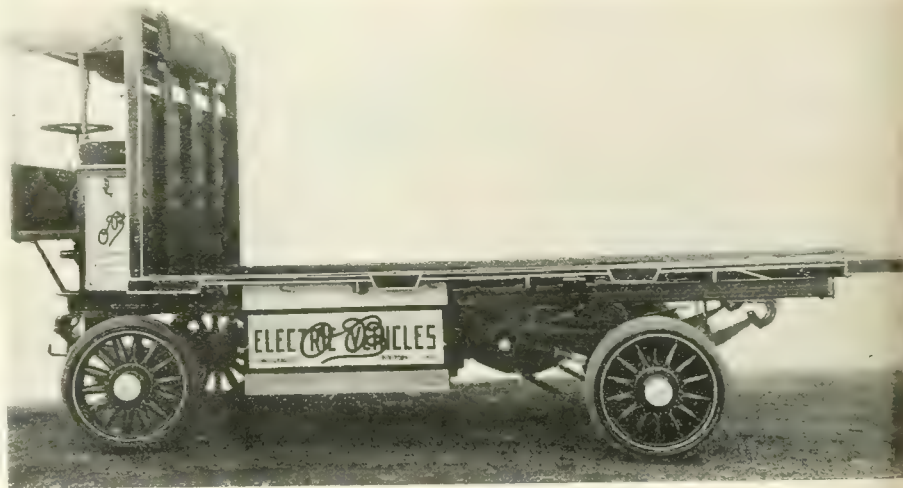
The battery is underslung between the front and rear axles. The battery box is made of angle steel riveted to the frame. There are guides on the floor for the battery trays, three trays being slid into the box from each side. After all of the trays are in place a cross bar is bolted in position in front of the trays, holding them securely in position. The battery box is covered by a sheet of compressed pulp which keeps out dust and water. Forty-four cell batteries are used on all models, which has been found most convenient for charging from 110 volt circuits. On the 3½-ton model the battery has a capacity of 300 ampere-hours.

The most interesting feature of the O. B. truck is the controller. It is of the resistance type, introducing resistance into the main circuit, which is gradually cut out. It will be understood that the single motor is of the series type and its speed under any given load can be varied by changing the voltage impressed upon its terminals. This can be conveniently done by including a variable

resistance in the motor circuit. It is true that a certain amount of energy is lost in the resistance, but the idea is to use the resistance only in starting, while maneuvering and when caught in a traffic jam, and the total amount of time that any appreciable power is lost in the regulating resistance is comparatively small. On the other hand, the use of an almost infinitely variable resistance has the advantage that it per-

one more step of the controller, and that is with all the resistance cut out of the circuit. The controller is located under the driver's seat, and the handle extends up from the seat at the side of the driver.

The wiring from the battery to the motor and controller is carried in conduit in the frame channel on the outside. The wires are laid in grooves cut in two boards which are placed with the grooved sides together. These boards



*New O. B. electric truck*

mits of jarless starting from rest and of exactly suiting the speed to traffic conditions. The resistance used is the Allen Bradley type of current compensator, which consists of a stack of resistance material, the resistance of which can be varied within wide limits by subjecting it to mechanical pressure. This compensator is combined with the O. B. controller. As the circuit is first closed, the current is compelled to flow through the compensator with very little pressure on the resistance material, hence it encounters a great deal of resistance, little current flows into the motor and the latter exerts but a very moderate torque.

As the controller handle is moved over further, the resistance material is compressed, its resistance is reduced and the current flow and motor torque increase. This continues until the resistance material is fully compressed and the resistance is at a minimum. There is only

are placed into the frame channel and the whole is then protected with a sheet metal cover.

Steering is through a spur pinion and sector reduction gear, with a large hand-wheel whose rim is wound with cord. The service brakes are of the internal expanding type and are of very large diameter. There is a pair of emergency brakes on the ends of the countershaft. Both brakes are equalized, and the operating devices of both are provided with ratchets by which they can be set in place.

As is customary in electric vehicles, anti-friction bearings are used throughout. The motor itself has ball bearings, and adjustable roller bearings are used in the front and rear wheels. For adjustment of the chain tension, radius rods are provided between the rear axle and the differential shaft housing. The turnbuckles on these radius rods are pro-

*(Continued on page 25)*



## Buyer's Department of The Commercial Vehicle

### Five Models Comprise Schacht 1922 Line

Capacities Range from 2 to 7 Tons—All Models  
Are Equipped with Four-Speed Gearsets

#### SCHACHT SPECIFICATIONS

Capacity, tons.....	2	3	4	5
Price.....	\$3,200	\$3,800	\$4,200	\$4,400
Wheelbase, in.....	156	156	168	168
Tires, front.....	36 x 4	36 x 5	36 x 5	36 x 6
Tires, rear.....	36 x 7	36 x 5-d	40 x 6-d	40 x 12
Bore, in.....	4 1/4	4 1/4	4 1/2	4 1/2
Stroke, in.....	5 1/2	5 1/2	6	6
N. A. C. C. h.p.....	29.0	29.0	32.4	32.4
Speed, r.p.m.....	1000	1000	1000	1000
Speed, m.p.h.....	15	15	20	15
Gear ratio in high gear.....	8.66 to 1	9.66 to 1	10.5 to 1	14 to 1
Final Drive.....	Worm	Worm	Worm	Worm

core, Schebler carburetor, Duplex governor, Westinghouse generator, Bosch magneto, Borg & Beck clutch, Merchant & Evans universal joints, and St. Mary's wheels.

The length in back of the driver's seat for each model is as follows: 2-ton, 11 ft. 8 in.; 3-ton, 12 ft. 8 in. for the 168-in. wheelbase and 11 ft. 8 in. for the 156-in. wheelbase; 4-ton, 12 ft. 8 in. for the 168-in. wheelbase, 11 ft. 8 in. for the 156-in. wheelbase and 14 ft. 8 in. for the 183-in. wheelbase; 5-ton, 12 ft. 8 in. for the 170-in. wheelbase; 11 ft. 8 in. for the 158-in. wheelbase, and 14 ft. 8 in. for the 185-in. wheelbase.

#### New Method of Control

(Continued from page 24)

vided with square portions at the middle of their lengths to take a monkey wrench. This same plan of providing square wrench seats is followed out in the hub caps. Another feature bearing on the servicing problem is that the squared portions of the hub caps of all models are of the same size, so the same size of non-adjustable wrench will fit them all.

The wheels are of the Archibald wood type with two-piece felloe. The springs are of the Spring Perch Co.'s make. All three lamps carried on the truck are of the same design, except that the rear lamp has one red glass. The trucks are sold with an equipment comprising the seat, lazyback, footboard and cushion.

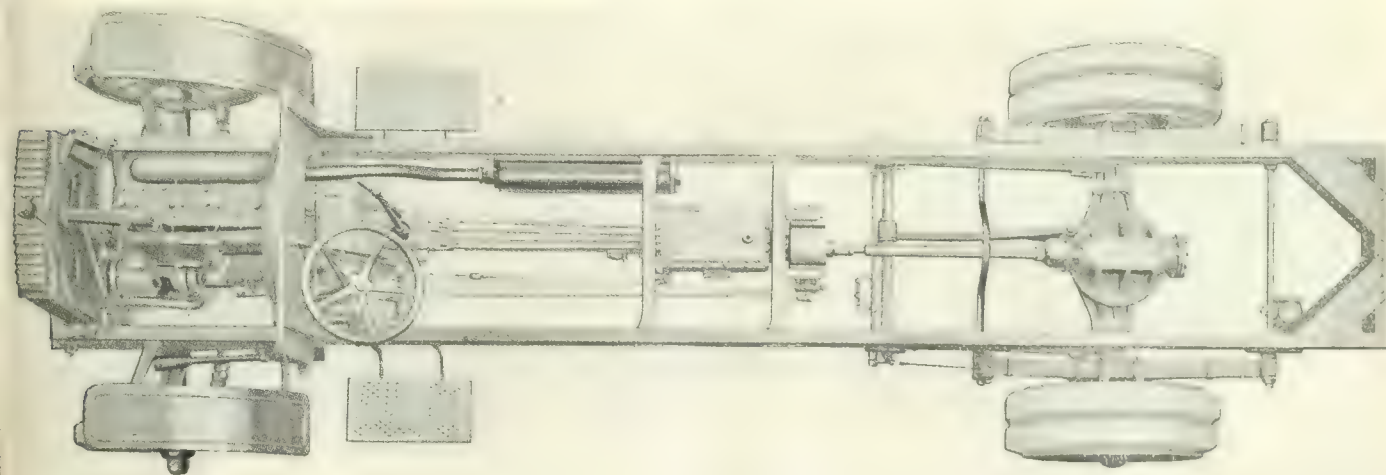
THE five models—2-, 3-, 4-, 5- and 7-ton—embraced in the new series of Schacht trucks made by the G. A. Schacht Motor Truck Co., Cincinnati, Ohio, incorporate a number of changes that will be of interest to fleet owners. The 2- and 4-ton models replace the 2½- and 3½-tonners made last year. Prices on all models are materially reduced.

This year, all of the models are equipped with four-speed gearsets. Last year the 3½ and 5-ton models were equipped with four and eight-speed gearsets, respectively. The two smaller models were equipped with three-speed gearsets. For extra heavy pulling or where a high rate of vehicle speed is desired for long distance transportation, the Schacht company will furnish it's eight-speed gearset at a slight additional cost. This special gearset has eight speeds forward and two reverse.

The 2-ton model, with the exception of the four-speed gearset, has been little changed in design from the 1921 model. The 3-tonner, compared with the 2½-ton size of 1921, differs only in brake and tire sizes. These are larger than before. The new 4-tonner, compared with the former 3½-ton size, has a larger engine and rear tires. The 5-tonner uses larger front tire widths and rear singles instead of duals.

The new models are all equipped with St. Mary's artillery wheels. This represents another change.

With the exception of the engine, radiator core, carburetor, governor, generator, magneto, clutch, universal joints and wheels, the units used in the assembly of these trucks are all manufactured and designed by the Schacht company. The outside units are as follows: Buda engine, Bremer radiator



Plan view of one of the Schacht chassis, showing driveshaft brake, frame construction and other details of design

## Buyer's Department of The Commercial Vehicle

### A-C Speedometer

THIS is a completely revised edition of the speedometer which the Champion Ignition Co., Flint, Mich., announced in 1919. While operating on identically the same principle as the previous instrument, the new model incorporates a number of radical changes and improvements. This speedometer operates entirely on the magnetic principle, having a stationary, permanent horseshoe magnet being driven by the flexible shaft which is connected to the driving mechanism of the truck. The armature revolves in the magnetic field between the poles of the horseshoe magnet. Between the armature and the stationary magnet is a non-magnetic element in the form of an aluminum cup having on its periphery a scale which indicates the velocity of the vehicle. This light weight cup is sensitive to the magnetic drag caused by the rotating armature throwing the magnetic lines of force in the direction of rotation. Owing to the light weight of the non-magnetic aluminum cup, the dial is very sensitive to the magnetic drag, allowing the instrument to start to register at a speed of 1 m.p.h. This is an identical feature employed in the previous instrument.

Changes include a non-adjustable magnet which is positively fixed in position. The speed element is now adjusted into and out of the magnetic field by an adjusting screw for calibration. An important improvement is the automatic lubrication of the high-speed bearings. These bearings operate within glands which contain oil.

### V & S Automatic Bearing Bolt

THIS bearing bolt has an Acme thread on the upper part and a standard thread on the shoulder. The Acme thread is left-hand and the standard thread right-hand. A slotted nut operated by a special wrench is secured to the shoulder and between this nut and the compensating nut which works on the Acme thread is a barrel-shaped spring. The action is that the spring tends to turn the compensating nut up against the bearing at all times and as there are no shims used in the installation the bearing is kept tight against the shaft. The price for bolts up to  $\frac{1}{2}$  in. is \$1. The maker is the V & S Automatic Bolt Co., 1120 State-Lake Building, Chicago.

### Niagara Cab Heater

THIS derives its heat from the exhaust. Two triangular heat chambers are features in design. The heat is transmitted from the muffler through a flexible metal tubing and is taken into the intake chamber, circulates through

### Truck Accessories

the exhaust chamber and out under the truck through another length of flexible tubing. The two heating chambers in turn transmit the heat to the top or radiating cover of the heater so that nothing but heat reaches the interior of the cab. The heat is regulated by a simple lever device which opens and closes a ground-to-a-fit valve. The maker is the Castor Distributing Corp., Niagara Falls, N. Y.

### Dreadnaught Truck Tire Chains

THESE are designed for pneumatic as well as for single and dual solids. The cross chains for pneumatics are case-hardened and coppered. The rim chains are straight link welded chain. Special lever fasteners connect the ends of the rim chains. For solid tires these chains are made in the standard pattern with extra heavy cross chains and hooks, with welded rim chain and lever fasteners of proper size and strength to stand up under the most severe usage. The maker is the Columbus McKinnon Chain Co., Columbus, Ohio.

### Savo Re-Atomizer and Decarbonizer

THIS device is an automatic ball spring actuated valve revaporizer, which is slipped between the carburetor and the intake manifold. A strong vacuum is created in a channel in the device by the suction of the gasoline across the surface aperture of the channel in the device opening into the intake manifold. By creating this condition in the channel, atmospheric pressure presses the spring ball valve located in the channel at right angles to the main channel which enters the intake manifold, pushing these balls off their seats and allowing the air to rush into the channel and up into the lower portion of the intake manifold. At this point, the gasoline in liquid form is blown into atoms by the onrushing stream of air, thus sending it into the intake manifold in a more gaseous form and more suitable for combustion. The maker is the Savo Sales Co., Utica, N. Y.

### Adjustable Rear View Mirror

THESE keep a positive rear view always before the driver of a business car or truck. They are rigidly attached and are adjustable. It is claimed they absorb all headlight glare, sun rays, mirror-like flashes and reflections from windshields. Prices range from \$3 to \$3.50, according to size. The

maker is the Auto Glass & Mirror Corp., Buffalo, N. Y.

### Chromine a Pyrene Non-Freeze Compound for Radiators

A NEW freeze-proof for motor vehicle radiators has been placed on the market by the Pyrene Mfg. Co., New York. This product is known as Chromine, a combination of chemicals which is stated prevents freezing at any predetermined temperature. The compound does not evaporate and it is claimed has no effect on the metal and rubber. Chromine also eliminates rust.

### Eclipse Timer for Fords

THE revolving part of the timer carries a rounded contact which brushes against the spring contact, not only making the contact, but wiping the surface off at the same time. Both spring contact and stationary contact can be replaced, the spring contact being 50 cents per set of five pieces. The price is \$1.50. The maker is the Eclipse Timer Mfg. Co., Milwaukee, Wis.

### P. E. D. Traffic Signal

A NEW type of P. E. D. traffic signal, designed as Model B, is being manufactured. It is designed for mounting on the left rear fender and signals both front and rear so that it warns a traffic officer or approaching vehicle as well as one in the rear. The signal operates automatically as it is connected with the steering gear and the foot brake. The price is \$12 and it is manufactured by the P. E. D. Corporation, 30 Church Street, New York City.

### Denonco Brake Bands for Fords

THIS is a two-piece brake band for Ford transmission drums claimed to eliminate chatter. The hinge allows the band to grip the drum evenly all around, and the construction is such that the band can be put in from the top of the transmission case without removing the transmission cover. The price per set of three is \$7. The maker is the Russell Mfg. Co., Middletown, Conn.

### Red-Cup Transmission Lubricator for Fords

THE device consists of a plate replacing the transmission cover on the Ford. A container operated by a key holds a lubricating compound which is released in small quantities from time to time by the key. It is claimed that this eliminates chattering and increases the life of the bands. The price is \$3. The maker is the Red-Cup Lubricator Co., Chicago.



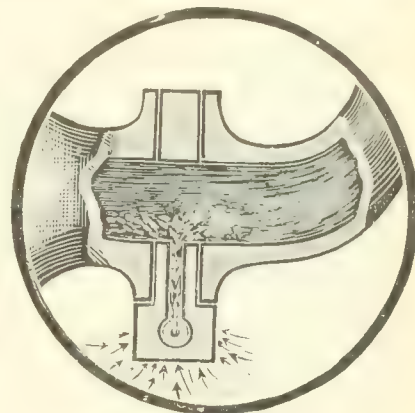
# Buyer's Department of The Commercial Vehicle



Niagara cab heater



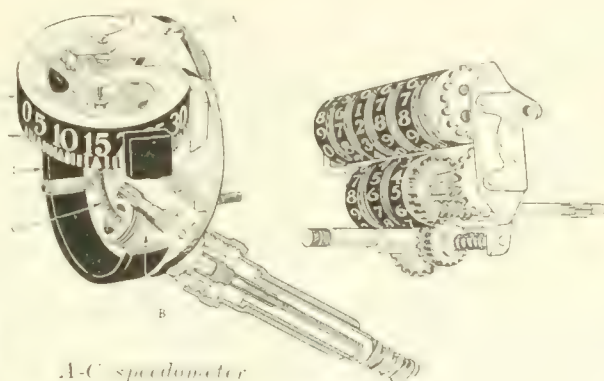
P. E. D. traffic signal



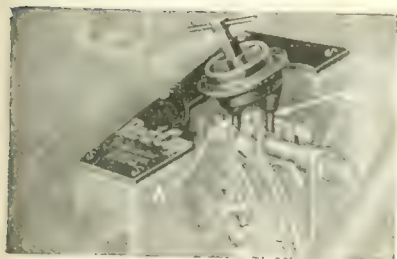
Savo re-atomizer



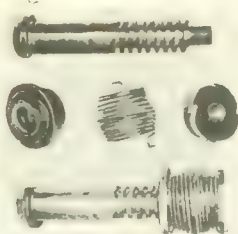
A-C speedometer



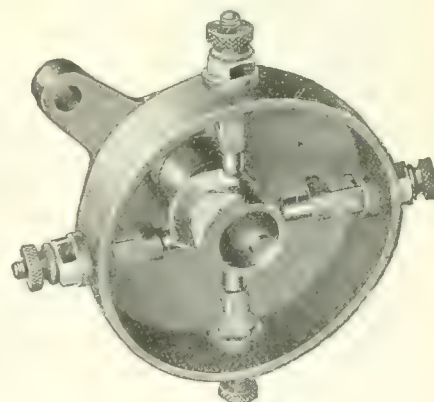
Denonco brake band for Fords



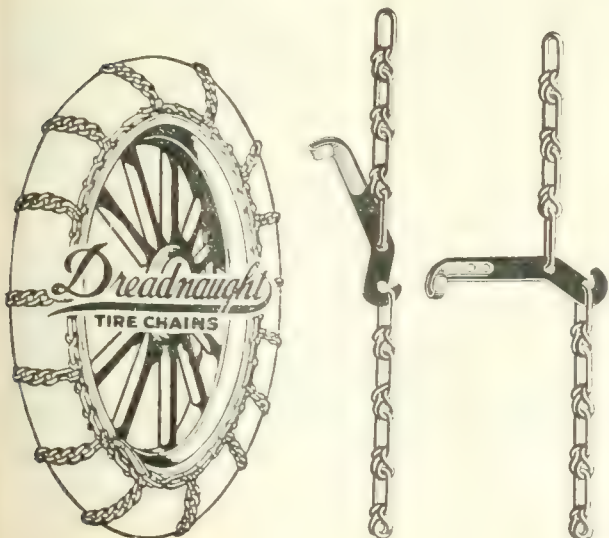
Red-Cap transmission lubricator for Fords



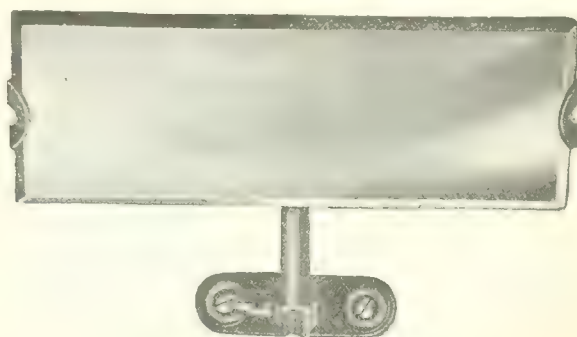
V & S automatic bearing bolt



Eclipse timer for Fords



Dreadnaught tire chains



Adjustable rear view mirror

## Buyer's Department of The Commercial Vehicle

### Parker Grinding, Drilling and Turning Machine

THIS may be classed as a portable machine shop in that the following operations can be performed on the one machine—grinding, valve seat reaming, refacing valves, grinding push rods, valve cages, commutators, gears, etc.; sharpening milling cutters, drilling and reboring pistons and a large variety of small machine operations. Specifications are as follows: Height of machine, 24 in.; weight, 125 lb.; horizontal travel of lower spindle, 2½ in. (graduated in thousandths); travel of upper spindle, 1½ in.; vertical adjustment, 8¼ in.; 4-in. three-jaw universal, with two sets of jaws; upper spindle bearing, special design ball bearing; motor ¼ hp. AC. or DC. to run from lighting circuit. The price is \$245, f.o.b. Detroit. The maker is the Ex-Cell-O Tool & Mfg. Co., Detroit.

### Universal Valve Spring Compressor

THIS is a valve spring compressor that may be used on practically any make of overhead valve engine. It is made of wrought iron and is said to be very rugged. The price is \$1.75. The maker is J. P. Harper, Bluefield, W. Va.

### Portable Shop Bench

BRINGING all the necessary tools to the job eliminates running back and forth, and effects a considerable saving in the time required to complete a repair job. This portable shop bench is strongly built. Its dimensions are 24 in. by 60 in. by 34 in. high, and it is fitted with a heavy hardwood top and a steel tray extending its full length. A vise can be attached. The drawers and compartments are equipped for locking. Folding the handle against the end makes the bench immovable. The weight is 285 lbs. The maker is the Welding Products Mfg. Co., Milwaukee.

### Franklin Air Compressor

THIS compressor has a separator which prevents oil from being pumped into the tire with the air. The separator is drained at its bottom at every stop of the motor by a pipe line running to the automatic control switch. It also acts as a pressure release, preventing the starting of the motor against high pressure in the tank. Prices vary from \$192 to \$225. The maker is the Franklin Air Compressor Co., Norristown, Pa.

### Automatic Extractor

THIS is used for removing inside races, cups, bearings, bearing sleeves, bushings, etc., and is built in

### Shop Equipment for Fleet Owners

two sizes. It consists of a crosshead carrying a screw and supported by two legs or braces. Upon the end of the screw is swiveled another crosshead which in turn carries two long fingers that are hooked at the end. Between these fingers is a movable wedge. When a bearing is to be removed the extractor is placed in position and the wedge and fingers inserted into the bushing as far as they will go, then the wedge is drawn up between the fingers until the hooks are tightened in the bushing. After this it is a simple matter to draw the bushing out by screwing up the nut on the main screw. The small extractor, capacity ¾ to 1¼, is sold at \$15, and the larger capacity, 1½ to 3½, at \$18. The maker is the Greb Co., Boston.

### Lightning Grip Bench Vise

A QUICK acting all-around bench vise which opens to 12 in. allowing the user to hold a battery while removing jars or other work. It is simply designed, there being no springs or other delicate parts. The jaw width is 9 in. The price is \$11. The maker is the Elebeth Co., Chicago.

### Stevens Ring Gage

THIS is designed to enable a mechanic to fit rings at his bench. In operation, one ring is first fitted to the engine. Then that ring is put in the ring gage. The next step is to measure the opening in the ring with a thickness gage. This measurement is then duplicated on all the rings on the ring gage at the bench. The special slot enables the mechanic to apply the thickness gage more conveniently. The device is polished and ground for accuracy of .00025 in. It is supplied in standard sizes and oversizes for all makes of vehicles. The ring gage with thickness gage costs \$2.75. The ring gage alone costs \$2.00. The maker is Stevens & Co., New York City.

### Milburn Oxy-Acetylene Welding and Cutting Outfit

THIS is of the balanced pressure type, operating on approximately equal pressures of oxygen and acetylene. The outfit consists of a welding torch 16 in. long, five welding tips for the torch, a cutting tip, one carbon burning tube 10 in. long, one S. G. regulator for oxygen and one for acetylene, one length

of oxygen three-ply hose 12½ ft. long, one length of three-ply acetylene hose 12½ ft. long, a beginner's supply of steel, cast iron and Tobin bronze rods and fluxes for same, one pair of welding goggles, wire frame, leather sides, one pair of gauntlet leather gloves, one Pyro friction lighter, one set of wrenches for torch, hose and regulators, and one fibre carrying case with reinforced riveted corners, oak tan leather handle and strap with buckle. The price complete is \$55. The shipping weight is 20 lbs. The maker is the Alexander Milburn Co., Baltimore, Md.

### Dalton Combination Machine Tool

THIS is designed to take the place of several machines. It is especially adapted for fleet owners who do all of their own repair work and whose shop space is not adequate to take care of a variety of machines. Two operations on the Dalton machine can be performed at the same time by one operator, or two persons can work at the same time upon different jobs.

The regular attachments furnished with each machine are: Two face plates, a slotted driver plate, round drilling table with table base, plain milling vise, four clamp bolts, set of change gears for cutting both English and metric threads, set of wrenches, one milling arbor and a double friction countershaft. Universal dividing heads, index centers, chucks, collet attachment with spring collets and turning tools are supplied and fitted at extra cost. The machine can be supplied with direct-connected motor, in any current. The horsepower required is 1½. The maker is the Dalton Mfg. Corp., Sound Beach, Conn.

### Red Giant Rim Tool

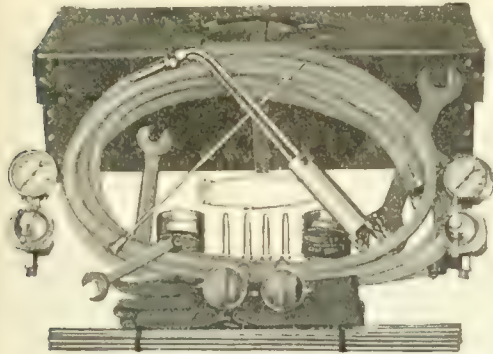
THIS is used for removing tires from split rims. After the hooks of the device have engaged the rim, the latter is expanded and opened at the split by the movement of a handle on the device. When tire is replaced, the rim is expanded to its proper place by this device. The price is \$7.50 and the maker is the Red Giant Tool Corp., Lynchburg, Va.

### Yellow Jack-It

THIS may be used for quick action in moving trucks around the garage, for changing tires, adjusting skid chains, etc. The truck can be raised any fraction of 11 in., from 8 in. when fully lowered, to 17 in. at maximum height. The handle can be worked from any angle, even when it is against a wall. When the truck is raised the handle may be placed against the vehicle and out of the way.



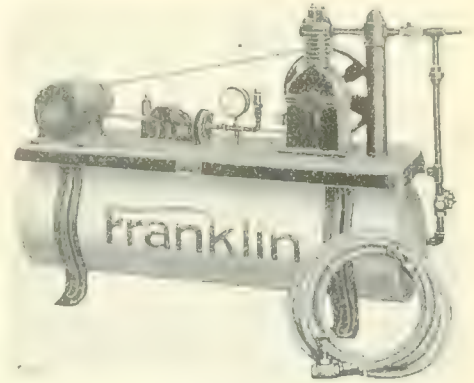
# Buyer's Department of The Commercial Vehicle



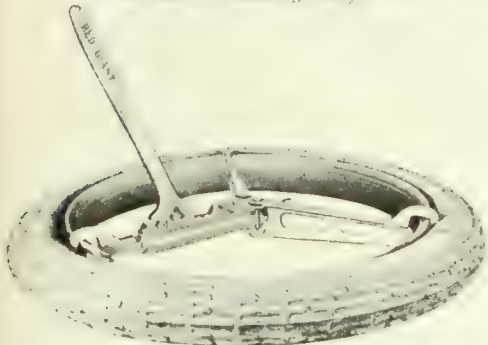
*Milburn welding outfit*



*Lightning grip bench vise*



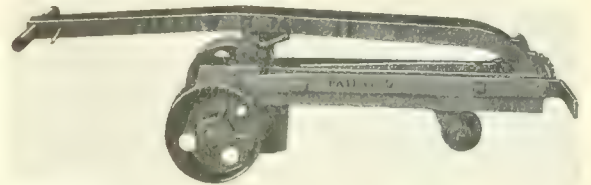
*Franklin air compressor*



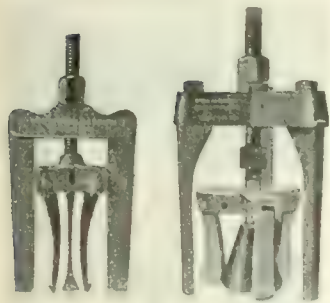
*Red Giant rim tool*



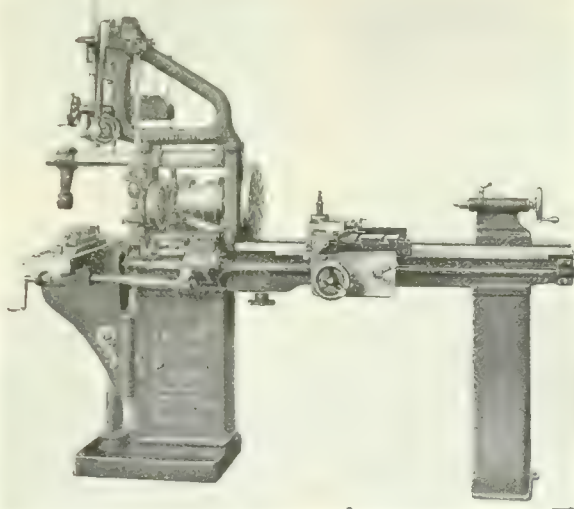
*Universal valve spring compressor*



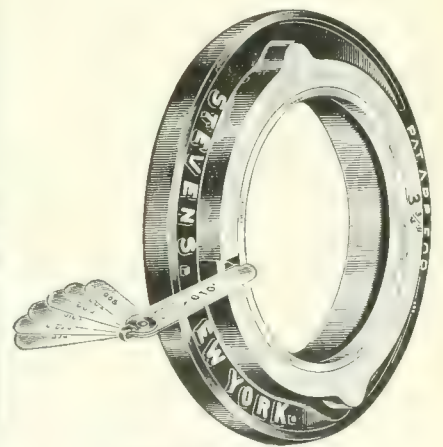
*Yellow Jack-It*



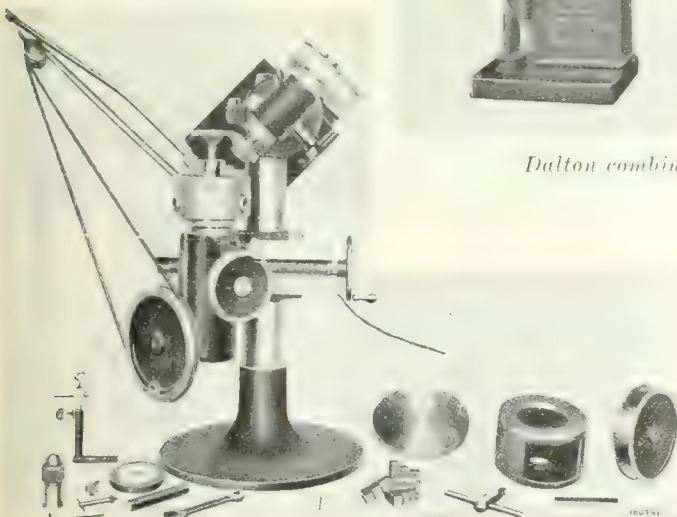
*Automatic extractor*



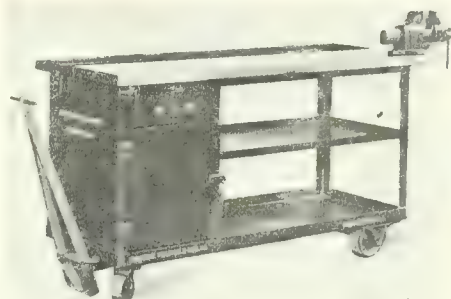
*Dalton combination machine tool*



*Stevens ring gage*



*Parker grinding, drilling and turning machine*



*Portable shop bench*

## Buyer's Department of The Commercial Vehicle

# Three-Way Hydraulic Dumping Mechanism

**Permits Unloading from Rear or Either Side—  
Weight of Mechanism Is Approximately 200 Lbs.**

FLEET owners using dump bodies do so because they save time and labor. A body of this type speeds up deliveries and that in the end means a considerable saving in operating expense. Refinements in dump body design with a view of giving additional operating economy are always of interest to contractors, coal dealers, and others using this type of body. And now comes the announcement from England of a three-way dumping apparatus that permits a coal truck or a contractor's truck to dump from the rear or either side. It is obvious, therefore, that this eliminates the usual and not always convenient practice of maneuvering a vehicle when dumping is from the rear only.

The Bromilow & Edwards hydraulic hoist, which is made in Bolton, England, is easily adapted to any make of truck chassis. The hoist is made with either single or double rams. The mechanism is simple, consisting of a reservoir containing medium light oil, an oil pump, with tube connections between the pump and the rams, and a suitable arrangement of valves.

The oil reservoir is placed beneath the chassis frame in a convenient position near the engine fly-wheel, so that the pump, which is of the double-plunger type, and contained within the reservoir, can be driven from the fly-wheel, through the medium of a leather-faced friction wheel and flexible shaft. The pump forces oil through copper tubing to the ram or twin rams. In the case of the twin rams, both are fed at the same pressure, and automatically, each does the same amount of work even though when tipping to the side the inner ram does not extend so far as the outer ram.

On the body reaching the maximum angle of tip provided, an automatic valve comes into operation, allowing the oil to by-pass, at the same time maintaining the pressure within the rams so that the body remains in the tipping position. When it is required to return the body to the horizontal position, a hand-operated valve is brought into operation, permitting the oil to return to the reservoir under pressure of the body upon the rams.

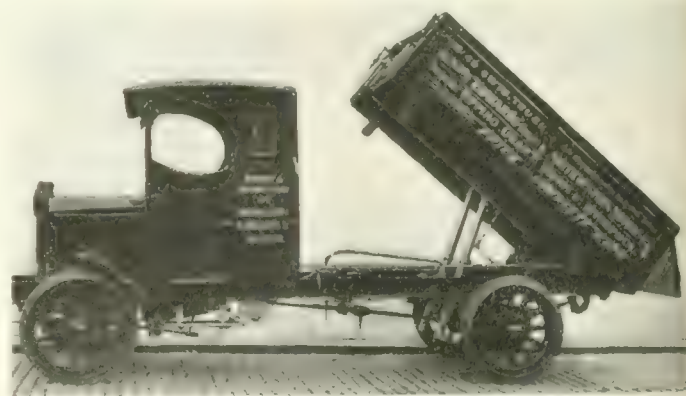
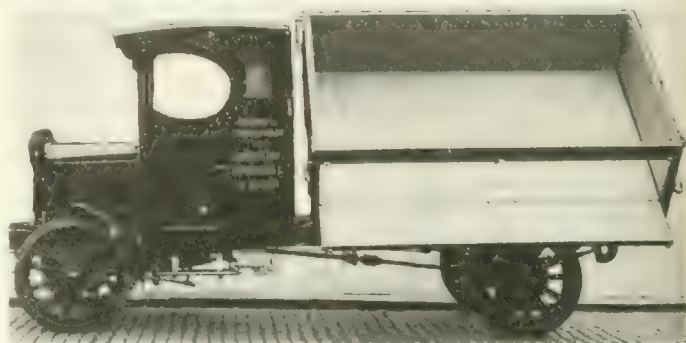
The rams are supported universally by cross members on the main chassis frame, permitting them to swing in any direction in unison with the motion of the body.

The direction of the tip is controlled by the driver or assistant, who pins or locks certain hinges; for instance, if it is required to tip to the right side, the right side hinges are pinned and the left side are loosened; if it is required to tip to the rear, the two hinges at the front are unpinned, and the two rear hinges, which are universal and serve for either rear or side tipping, are made fast. By providing universal hinges at the rear, four hinges serve instead of the more usual six.

To overcome the possibility of leakage in the copper tube connections a special gland arrangement has been designed, allowing for a certain amount of movement and thus relieving and nullifying the effect of vibration, preventing possible crystallization.

Though the pump in the oil tank is operated by eccentrics in the trucks now using this apparatus in England, it is stated that there is a possibility that cams will be used instead with a view of economy in manufacture.

When the body is lowered, it is stated that the rams have sufficient clearance from the ground to avoid damage. In fact they are a few inches higher from the ground than the



*The Bromilow and Edwards body and tipping mechanism in operation, showing the double rams. Note hinges at body corners*

rear axle. The two rams are attached to the underside of the body by ball sockets, thus giving universal action with the movement of the body in all directions.

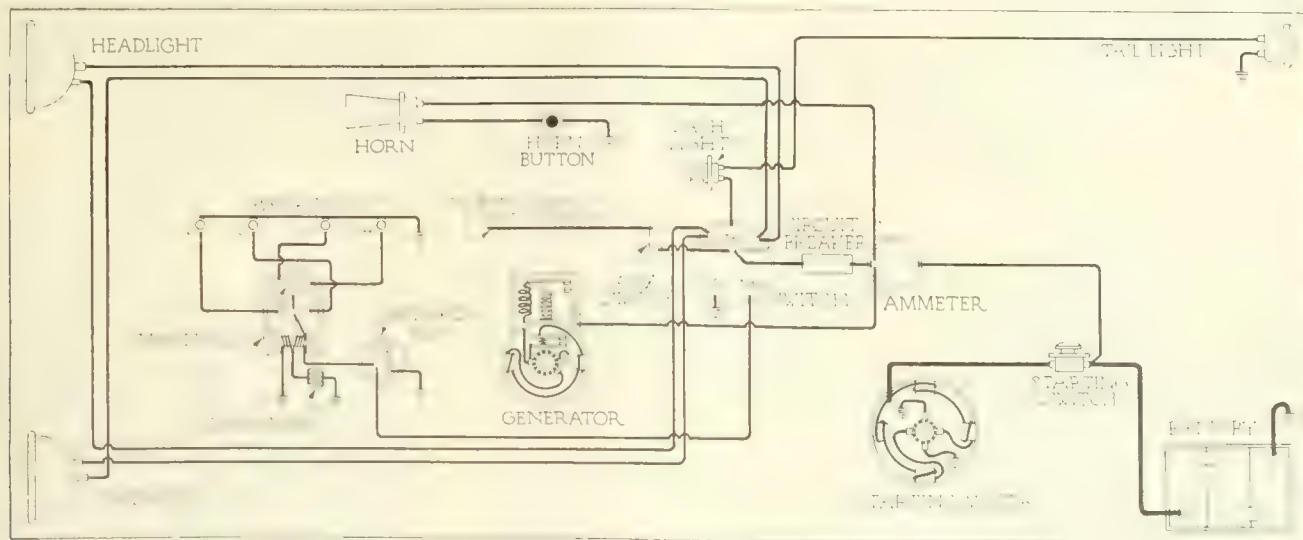
About 1 gal. of oil is all that is necessary for the proper functioning of the apparatus. It is possible to use old oil taken from the engine.

The whole apparatus weighs approximately 200 lbs. Prices range from \$262.50 to \$300, according to size.



# Motor Truck Electric System Wiring Diagrams

## 48—Starting and Lighting Unit on G. M. C. Truck



Starting and lighting system used on the G. M. C. 1-ton truck, model K-16

### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

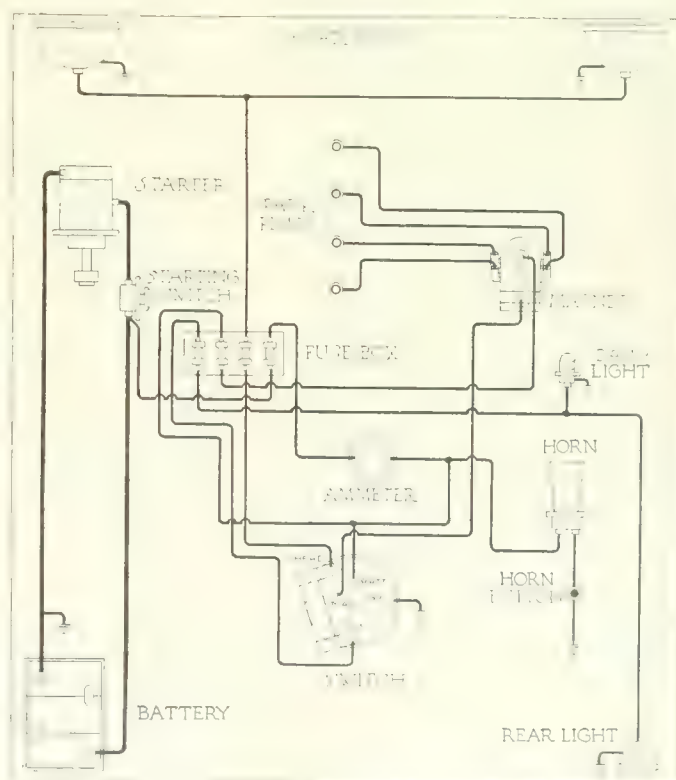
#### 1920

1—Ford, Starting and Lighting.....	Oct. 1
2—Acme, Lighting.....	Oct. 15
3—Bethlehem, Starting and Lighting.....	Oct. 15
4—Atterbury, Lighting.....	Nov. 1
5—Ace, Starting and Lighting.....	Nov. 1
6—Atlas, Starting and Lighting.....	Nov. 15
7—Briscoe, Starting and Lighting.....	Nov. 15
8—Defiance, Starting and Lighting.....	Dec. 1
9—Commerce, Starting and Lighting.....	Dec. 1
10—Grant, Starting and Lighting.....	Dec. 15
11—Brockway, Starting.....	Dec. 15

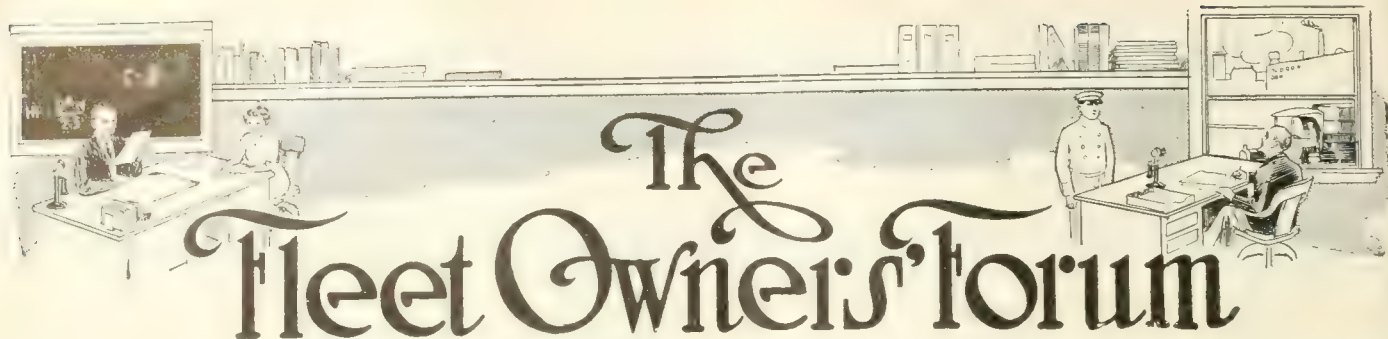
#### 1921

12—Maxwell, Lighting.....	Jan. 15
13—International, Starting and Lighting.....	Feb. 1
14—Mack, Starting and Lighting.....	Feb. 15
15—Vim, Starting and Lighting.....	Mar. 1
16—Oldsmobile, Starting and Lighting.....	Mar. 15
17—Reo, Starting and Lighting.....	Apr. 1
18—Sterling, Starting and Lighting.....	Apr. 15
19—Stewart, Starting and Lighting.....	May 1
20—Kelly-Springfield, Starting and Lighting.....	May 15
21—Riker, Starting and Lighting.....	May 15
22—U. S., Starting and Lighting.....	June 1
23—Wilcox, Lighting.....	June 1
24—Pierce-Arrow, Starting and Lighting.....	June 15
25—Republic, Starting and Lighting.....	June 15
26—Parker, Starting and Lighting.....	July 1
27—Noble, Starting and Lighting.....	July 1
28—Oneida, Starting and Lighting.....	July 15
29—Oshkosh, Starting and Lighting.....	July 15
30—Knox, Starting and Lighting.....	Aug. 1
31—Master, Lighting.....	Aug. 1
32—Watson, Starting and Lighting.....	Aug. 15
33—Service, Lighting.....	Aug. 15
34—Packard, Starting and Lighting.....	Sept. 1
35—Tiffin, Starting and Lighting.....	Sept. 1
36—Napoleon, Starting and Lighting.....	Sept. 15
37—Dorris, Starting and Lighting.....	Sept. 15
38—Moreland, Lighting.....	Oct. 1
39—Northway, Starting and Lighting.....	Oct. 1
40—Rock Falls, Starting and Lighting.....	Oct. 15
41—Locomobile, Starting and Lighting.....	Oct. 15
42—Seneca, Starting and Lighting.....	Nov. 1
43—Brockway, Starting and Lighting.....	Nov. 1
44—Schwartz, Starting and Lighting.....	Nov. 15
45—Garford, Starting and Lighting.....	Nov. 15
46—Four Wheel Drive, Starting and Lighting.....	Dec. 1
47—Jackson, Starting and Lighting.....	Dec. 1
48—G. M. C., Starting and Lighting.....	Dec. 15
49—Apex, Starting and Lighting.....	Dec. 15

## 49—Starting and Lighting Unit on Apex Truck



Starting and lighting wiring layout as used on Apex  
2½-ton truck, model E



## Wants Data Covering Establishment of Freight Line

To the Editor, COMMERCIAL VEHICLE:

I am starting to operate a schedule freight line between Boonville and Evansville, Ind., a distance of 20 miles.

I want any information that might be of interest to me. I would like to know the following:

Who would be a good printer to get in communication with for freight bills and such printing as I may need?

About what rate do you think trucks can operate on this length of haul? The roads are good, ten miles being of concrete and ten of good gravel.

Should I establish a parcel delivery and gathering truck at each end of my line? Boonville is a good city of 5000. Evansville is a central market city of 100,000. Nearly everything is purchased from Evansville wholesale houses. A great deal of coal mine machinery and supplies is used here.

I have to compete with steam road freight and traction freight. Of course in each case I have the advantage of saving the drayage from the stations to the consumer.—F. W. TRAYLOR, Boonville, Ind.

As regards printing freight bills, etc., we do not know of any printing concern in your locality which handles this work. However, we believe you can get this information without difficulty by dropping a line to Tom Snyder, Secretary Indiana Transfer & Warehousemen's Association, 201 Transportation Bldg., Indianapolis, Ind.

As regards rates to be charged in your locality, you will have to base your rates to a certain extent on local conditions as regards competition, etc., but mainly on your costs of operation. It would be impossible to quote you definite costs without having further details as to the amount of tonnage hauled per truck, the capacity per truck, number of runs per day, drivers' wages, etc. Perhaps the truck rates for similar length runs in the vicinity of New York might be of interest. Trucking charges from New Rochelle to New York, a distance of 17 miles are 25 cents per 100 pounds. Charges from Stamford, Conn., to New York, a distance of 34 miles are 60 cents per 100 pounds.

Mr. Snyder is also secretary of the National Association of Commercial Haulers and we believe that a letter to him on the question of rates would furnish you with some very valuable information.

The question of establishing a parcel delivery and collection truck at either end of your line would depend largely

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

upon the type of freight hauled and the location of the shippers. That is to say, if you have contracts or secure contracts with a limited number of houses shipping large quantities of freight it would seem better to collect this freight with the truck that makes the run rather than operate another, smaller truck for this purpose. On the other hand, if you find your business lies in the field of the small shipper whose numbers and location make the matter of collection and distribution a lengthy business it would seem better to operate a smaller truck

## Is Your Knowledge Available?

HOW often have you remembered reading a certain article in THE COMMERCIAL VEHICLE and then found it impossible to locate? Nine times out of ten the particular issue has been mislaid. It would be a good plan to keep a permanent file.

In addressing this department, readers are requested to state whether a permanent file is kept, for many times inquiries to this department can be best and most fully answered by reference to previous issues.

at either end of the line in connection with a small goods yard, collecting the goods as they are available and waiting for a full load before making your long run with your big truck.

It might be suggested here that your freight rates be based on a cost plus estimation. That is, estimate the cost of operating your trucks conservatively, including overhead expenses and add to this cost a reasonable profit, scheduling your charges accordingly.

As regards printing schedules, etc., we note that the Elkhart & South Bend Motor Bus Co. has a printed schedule. Probably a line to them addressed to the

attention of L. B. Tracy would put you in touch with their printer.

## Use of Trucks and Trailers in Store Door Delivery

To the Editor, COMMERCIAL VEHICLE:

I would like to get more information on Store Door Delivery as I think this is the only delivery for my work. How many trucks and trailers or tractors and trailers would it take to handle 100 tons per day with a haul of from 2 to 8 miles. The roads are good. There is no unloading to take care of. What would be the cost per vehicle. The truck and trailer would have to carry about a 10-ton load. Is there any place where this has worked out successfully?—C. W. HAIGHT, Quick Service Express, East Chicago, Ind.

In the first place it would seem that with a tonnage of this quantity it would be better to operate a truck and trailers or trucks and trailers rather than tractors, provided you will not run against any local snags in the operation of such vehicles of a high tonnage. In this connection it is presumed that you have investigated the question of taxation on such heavy vehicles. We do not know of any ordinance forbidding the use of trailers, however.

The number of vehicles necessary will depend largely upon the number of shipping and receiving points. That is, if you have to collect and deliver this tonnage from and to a large number of shipping and delivery points a great deal of time will be consumed in such collection and delivery and you will probably be unable to make many trips per day. On the other hand if you collect the entire 100 tons from one or two points and deliver them to one or two points, you should, with an eight-mile run be able to handle the entire tonnage with one or two trucks and two trailers.

We refer you to the Dec. 15, 1920 issue of THE COMMERCIAL VEHICLE, page 320. This article shows how one truck and trailer hauled 50 tons per day on a 10-mile run. These figures, by the way, are average figures collected from a number of vehicles. The article itself is a comparison of a 5-ton truck alone with a 5-ton truck and a 5-ton trailer. You will note that the cost per mile charged for truck and trailer is \$.536, while the cost per commercial ton-mile is \$.106. We believe that a comparison of these figures with your own conditions will give you a good idea of the equipment necessary to handle 100 tons per day on your 2- to 8-mile run.



## Wants Driver's Report Form in Package Delivery

To the Editor, COMMERCIAL VEHICLE:

We would be interested in an illustration that would show a good way of keeping track of department store packages after they leave the shipping platform. We have up to this time relied entirely on verbal reports from our drivers upon their returns of packages that could not be delivered. In the majority of cases, the people were not at home. Other reports included wrong addresses, credit, etc. It seems to us that you might have in mind a form that would take care of this important detail in package delivery.—READER.

The accompanying illustration shows a form used by The Sterling & Welch Co., Cleveland. As will be noted, this report is in duplicate, one report going to the customer and the other handed in to the delivery department. When the driver finds that his customer is not at home, he fills out the report, noting at the same time that he has either left the package with a next door neighbor or janitor. A signature for the receipt of the package is received. This report is left in the letter box or is put in some other place where it will be seen by the customer when he arrives home. Space is left for reporting reasons for the return of packages.

## Wants Piston and Pin Information on Pierce-Arrow

To the Editor, COMMERCIAL VEHICLE:

I operate a 2-ton Pierce-Arrow, and would appreciate your answering the following questions:

- 1—What is the compression distance?
- 2—What is the piston pin length?
- 3—What is the piston pin diameter?
- 4—Does this engine use an oscillating or stationary pin?
- 5—What is the width of the rings?—READER, New York City.

The answers to your questions are as follows:

- 1—Two and  $\frac{1}{2}$  in.
- 2—Three and  $\frac{3}{4}$  in.
- 3—This is 1.0625 in.
- 4—Stationary.
- 5—Three-sixteenths in.

## Persistent Knock in No. 1 Connecting Rod

To the Editor, COMMERCIAL VEHICLE:

What would cause a knock in the No. 1 connecting rod? My engine developed the knock shortly after it was delivered. The rod can be adjusted up so that it will not knock for a short time, but it comes back within a few days. We have put in new timing gears, new piston and rings and wrist-pin, but without any success. We are figuring on trying a new connecting rod. The crankshaft seems to be alright.

2—What kind of a knock will a misalignment of the connecting rod make?—READER.

1—This trouble is probably due to a sprung rod. The proper procedure is to remove the connecting rod and piston and line them up on an aligning jig, if one is available. Another method is to disassemble the rod and piston and inspect the former with the aid of two

plain arbors. These should be about 18 in. long, and made so that they will fit the crankpin bearing and the upper end of the rod. With them in place, the extreme length will so exaggerate any twist of the rod that it will be easily apparent. The proper remedy, of course, is to spring the rod until the centers of the two arbors are in perfect alignment. This corrects a twist. If the rod is sprung sidewise the centers of the arbors will not be the same distance apart on both ends.

2—The rap of a sprung rod becomes audible at speeds of 12 m.p.h. or over, and sounds something like the knock caused by a loose wristpin.

## Rebored Engine Has an Annoying Click

To the Editor, COMMERCIAL VEHICLE:

We rebored the cylinders and now there is a click in one of the two center

**DRIVER'S REPORT**

Name \_\_\_\_\_

Address \_\_\_\_\_

Our delivery called today, but as there was no one at home your purchase will be delivered on our next regular trip, unless delivery was made as checked below

Left Next Door at No. _____	
Left with Janitor _____	
SIGNATURE _____	

**The Sterling & Welch Co.**

By \_\_\_\_\_ Driver

Date \_\_\_\_\_ 192 \_\_\_\_\_

**RETURNED**

REASON	Check	REASON	Check
Wrong Address		Sent MONDAY	
Not at Home		TUESDAY	
Will Call		WEDNESDAY	
Redd		THURSDAY	
To be Changed		FRIDAY	
		SATURDAY	

PLEASE ORIGINAL AT CUSTOMER'S DOOR  
KEEP IN DUPLICATE TO DELIVERY DEPT

Driver's report form for package delivery

cylinders which sounds like a loud tappet click. It is not in the valve assembly as we have renewed all valve guides, valves, tappets, and tappet guides and camshaft bearings and the adjustment is as close as can be tolerated. We have even changed the valves several times but the click persists. We do not think it is caused by any defect in the boring job as this was done very carefully, but the wristpin holes were reamed on account of not being able to get standard pins. Could these be reamed out of square with the cylinders and could this cause a clicking noise, or do you think it is caused by a badly fitting ring? How would you go about finding the cause of this noise?—F. R. K., San Antonio, Tex.

You may have a small amount of end-play in the crankshaft. It is also quite possible that the pistons were reamed out of square. This should not have caused the click to develop immediately as some time would have to be allowed for wear.

A badly fitting ring many times gives rise to the clicking noise. It can usually be detected by injecting a few table-spoonsful of 600 W oil or glycerine into the combustion chamber. If the rings or a ring are at fault the heavy lubricant will take up the lost motion and, acting as a cushion, eliminate the click for a short time. Cutting off the ignition from the suspected cylinder should eliminate the noise if it is caused by a badly fitted wristpin or connecting rod bearing. However, the final and really the only satisfactory method of locating the last named will be to disassemble and examine the suspected parts.

## Figuring Performance of Truck Engines

To the Editor, COMMERCIAL VEHICLE:

Is there any way to figure the possible performance of a truck? We have tried it in this way; we multiplied the horsepower of the engine by the number of crankshaft revolutions made per mile, which, of course, is determined by the gear ratio and tire circumference. We then divided that product by the weight of the truck, and the number so arrived at was taken as the performance. However, we did not know what to consider as the correct horsepower when figuring, for the reason that an engine will not develop its maximum horsepower at the ordinary driving speed.—J. McARGLE, New York City.

The only way in which to arrive at a definite conclusion is with the aid of a test card of the engine under consideration. The card of another engine of the same make will not do, for the reason that, as you are doubtless aware, there is considerable variation in engines of exactly the same dimensions. A graph showing power and torque at various engine speeds will enable you to calculate performance.

## Anti-Freeze Solutions at Various Temperatures

To the Editor, COMMERCIAL VEHICLE:

Please give information covering the use of anti-freeze solutions for truck engines.—H. T. WARD, Harrisburg, Pa.

If an anti-freeze solution is not used in cold weather, it will be necessary to drain off the water if the truck is left exposed to a temperature below 32 deg. F. A drain cock will be found in the bottom of the radiator.

It is necessary to test the following alcohol solution from time to time, as the alcohol evaporates and the solution loses its strength:

Alcohol	Water	Freezes at
25%	75%	Zero
30%	70%	5 deg. below
40%	60%	20 deg. below

The following glycerine solution is also recommended for extremely cold weather, as the water tends to evaporate, leaving the glycerine behind, causing the solution to grow stronger instead of weaker.

Al'hol	Glyc'ne	Water	Freezes at
15%	15%	70%	Zero
16%	16%	68%	5 deg. below
20%	20%	60%	20 deg. below





## The Bus and the People

UNTIL quite recently street car lines have had practically a monopoly of short-haul passenger transportation. Competition is a great agent of modification and improvement. But the street car lines have been forced to modify nothing—for they have had no competition to contend with.

Some of the street car companies have used their prerogatives well and given the best service they could compass to the public. Others have been more interested in selling stock than in serving the people for whom they are in operation, and the service has not been so good.

But now motor buses have come along. Competition has sprung into being. The public has a new kind of short-haul transportation presented to it. And where the street car line service has been poor the people have a new idea of what short-haul transportation may be and what good service to the public means.

There can be no question but that the public has gone on record as approving of bus transportation. Even jitneys, which are to be deplored when entirely unorganized, have won the patronage of the public in many instances. And now well-organized bus lines all over the country are stepping into cities of the second class and pretty well solving the transportation problem to the satisfaction of the public.

But the street car lines, although they see the trend of events, especially where some of them have come to grief and have been entirely eliminated through bus competition, are not yet fully alive to the position.

The people as a whole, throughout the country, have come out strong for buses. Even where street car service has been good—and in many cases it has been excellent—buses are good, too, and have come in for their share of the patronage of the traveling public.

Therefore, the street car lines are faced with a competition already known, and known favorably to the people for whose patronage they are contending.

The human reaction to the discovery of a rival is the impulse to blot him out—destroy him—remove him from the path. That is true in all walks of life and in business. But impulses are due to instinct rather than to reason and—this is a new case in point—instincts can be very misleading.

In certain cases the street car lines, faced with unrestricted jitney competition, have gone after the jitneys and had them prevented from operating. In most cases they have been quite justified.

But in other cases street car lines seem to show a tendency to fight the organized bus lines. This is a foolish proceeding, because the street railways are fighting more than a few small business organizations. *They are fighting the people's will*—for the people have come out strong for buses.

But they are doing more than bucking a proposition that always wins. *They are flying in the face of their own interests.* For buses are now almost essential to street car line expansion, refinancing and success.

The question now is, will the street car lines profit by the writing on the wall and try to co-operate with and even possibly absorb the bus idea, to the general satisfaction of the public, or will they continue in a well-worn, conservative groove of street cars or nothing?

How can the street car companies adapt bus transportation to their own requirements and fit its use into the street car service? First, by realizing that there is a field for each. Second, by limiting the development of street car lines to the field they *can* serve. And, third, by incorporating the motor bus as a part of their business system, serving the fringe of their territory outside the field in which street cars will pay. Elsewhere, where buses are already established in competition, they can only give the best service possible and wait for time to show which kind of transportation is better for that particular set of conditions.

Buses will never eliminate street cars altogether. But neither can the street car lines replace the buses altogether. For the bus has come to stay. Each has its advantages and disadvantages and each has its field. Street car lines can maintain a headway in crowded districts, which, in view of the greater capacity of the street car, will handle a much larger number of people than buses could handle on one street. On the other hand, the bus is more flexible in traffic, is cheaper to install and can alter its route with the shifting population without tearing up expensive tracks and laying down others.



# Indiana Association Wants Higher Fees

## Good Roads Paramount Issue at Convention of Transfer and Warehousemen

INDIANAPOLIS, Dec. 3.—Agreement by the State Highway Commission of Indiana and a committee from the Fourth Annual Convention of the Indiana Transfer and Warehousemen's Association that an increase of the license fees of all Indiana motor vehicles seemed the only feasible method of raising the needed increase of funds for the construction of the State's Federal aid roads; and the promise of the transfer and warehousemen that their organization of fleet owners would not only accept this stand but go out and work for the raising of the license fees in order to help the State take up the unearned \$4,500,000 of the Federal aid funds of the original apportionment to the State, was the outstanding feature of the fourth annual convention of the association that closed its sessions with the annual banquet this evening.

Many other important steps were taken by the convention and its members. But this action, which will place the association and its members before the State and its important communities as an active force for the advancement of roads, will be to the advantage of every user of the important highways and gives the association an unselfish point of view and an unusual approach to the citizens of the commonwealth.

The association will actively engage in work to convert the citizens as to the need of higher fees. The average license in Indiana is now but \$6 per year against \$11 for the country at large. The association is in favor of the Uniform Motor Vehicle Tax and will work for it.

The second day of the convention began with the address of the president, B. J. Bartlett of Huntington, Ind. He was followed by Russell N. Edwards, warehousing engineer of Indianapolis, who in a paper on "Warehousing as Related to Industry and Transportation," discussed the advancement of the near future when the warehouse will become the motor vehicle terminal, connected with the railroad by a switch, which will tie up these two important elements of transportation.

Congestion of the railroad terminals can then be relieved and the short haul and long haul goods be handled more expeditiously than they have been in recent years. Citing that the post office in its parcel post department now follows a system that must be adopted by the transportation people in general, he showed that the location of the ideal warehouse and terminal of the future must serve both the rail and the motor vehicle or the water routes if those are the main transport avenues.

Among the resolutions adopted were

# ALAMEDA COUNTY FIRST TO REGULATE LOADING AND SPEED

OAKLAND, CAL., Dec. 5.—Alameda county is the first county in the State to take into its official hands the regulation of the loading and speeds of motor truck and motor stages. County speed patrolmen have been appointed and mounted in Ford runabouts. Twelve arrests have resulted, largely from overloading of trucks with sugar-beets on their way to the mills. The law is that rubber-tired vehicles must not carry more than 700 pounds for every inch of tire width, while those with steel tires are limited to 600 pounds for every inch.

those agreeing that the association become affiliated with Allied Motor Commerce, Inc., of Indiana; that it enter into reciprocal relation with the Chamber of Commerce of Indiana, with the National Chamber of Commerce; and that it join the National Highway Traffic Association provided it is granted representation at the annual convention. Endorsing the proposed establishment by the Allied Motor Commerce, Inc., of a Cartage and Motor Transport School in Indianapolis, a promise was made to cooperate and to aid the project in every possible way.

The newly elected officers are: President H. L. Oliver, Muncie; secretary, Tom Snyder; treasurer, Joe Seiter, both of Indianapolis; vice-presidents, C. E. Travis, Vincennes; Fred Geiger, Evansville; W. S. Armstrong, Bedford; J. M. Hedges, Terre Haute; W. S. Frye, Indianapolis; Cary Shinkle, Anderson; Walter Ardapple, La Fayette; M. P. Costin, Peru; E. J. Bartlett, Huntington; W. P. Woodworth, South Bend; Forrest Munger, Richmond.

## Truck Transportation Feature of 1925 Exposition

NEW YORK CITY, Dec. 12.—The Atlantic-Pacific Highways and Electrical Exposition, international in scope, will be held in Portland, Ore., in 1925. That year will mark the completion of four transcontinental highways and is also the centenary of the discovery of the electro-magnet.

Highway transportation will be the feature of the exposition and there will be exhibitions of all classes of motor vehicles, road building apparatus, etc.

According to preliminary plans, the exposition will last 10 months and will cost \$50,000,000. Portland has already voted funds for the exposition and the State of Oregon will soon follow.

Robert E. Smith, director of the affair, visited New York last week and while here outlined some of the plans. Much of the advertising in connection with the exposition will encourage visitors to make the trip by highway.

# Parts Makers Join in Service Plan

## Stations to Be Opened Early in 1922 in Large Cities of Country

DETROIT, Dec. 10.—A combined parts service plan will be inaugurated soon after the first of the year by the leading unit parts makers. The preliminaries of the plan have been practically completed and definite steps are being taken to locate satisfactory service stations in the larger cities of the country.

Uniting in the plan will be at least one manufacturer of each important unit entering into the construction of a motor vehicle. The second manufacturer of any unit can join in the movement only with the consent of the first company to accept the plan. The cost of maintaining the stations will be borne proportionately by those participating.

The purpose of the plan is to provide general parts for all replacements and to supply them with the least possible delay. Stations and substations will be so located that any unit will not be more than six hours distant from any place in the United States. Each station will carry a complete stock of all parts used in motor vehicles with particular attention to those subject to the hardest wear.

Prices on the parts will be fixed by the factories and will be uniform in all sections except for differences resulting from shipping costs to distances far removed from the factories. Field men will keep in constant touch with the stations to see that stocks and prices are maintained as required by the factory.

The principal stations will number about forty and each will have six substations. This would mean a total of 280 stations in operation under the plan. Each will be locally owned and operated except for the conditions as to prices and stocking set up by the unit parts makers.

In planning the inauguration of the new service system, the factories are working in close cooperation with the manufacturers in specialized unit vehicles.

## Referendum on Motor Buses in Battle Creek

BATTLE CREEK, MICH., Dec. 9.—Citizens in this city will be given an opportunity, in a special election, Dec. 17, to choose between trolley cars and motor buses. The Michigan United Railways, now operating under a 10-cent cash (four tickets for 25 cents) fare, which has not paid expenses, has agreed with the city to pay election expenses and abide by the voters' expression, in the matter of future service. The city has agreed, in the event of the voters favoring motor buses and the company suspending service, not to take any legal action against the company's franchise.



## Ruling Permits Truck Competition

### California State Railroad Commission Will Not Restrict Use of Roads

SAN FRANCISCO, CAL., Dec. 6—Owners and operators of motor truck fleets and lines, and of motor bus systems, are feeling much more secure in their investments as a result of a ruling just issued by the California State Railroad Commission, which has jurisdiction over all forms of transportation—land, water and air—in this state. The ruling is to the effect that the commission will take no steps against motor truck and motor bus lines which parallel railroad lines, even though these automotive lines are tending to put the railroads out of business, as most of them slowly but surely are doing. The commission also states that, if there is to be any fundamental change in the attitude and policy of the state toward such automotive lines, and in regard to the free use of state highways by motor truck and motor bus companies, such change will have to come as the result of legislation, not as executive orders from the commission, or through the invocation of the initiative by the people.

This ruling is of tremendous importance to the truck and bus line owners, because it means that the roads of the State are to remain open to these operators, and also is taken to mean that the State Railroad Commission will not impose extra taxes on the motor truck and bus lines for the upkeep of the highways. The statement comes as a reply to a letter written by R. B. Swayne, of San Francisco, to the commission, protesting the use of highways paralleling rail lines by motor trucks and passenger buses, and suggesting that the automotive carrier companies should not be allowed to do this. Mr. Swayne contended that this form of competition is unfair because the motor companies make use of the highways built at public expense, and that they do not pay taxes in the same proportion as the railroads.

The commission's reply is long, goes into minute details of the situation, and seems to be the first statement of the kind issued by a transportation-controlling body in any State, expressive of the attitude of the Government of that State toward motor vehicle operators and their industry.

The commission points out that the motor-carrier industry developed and attained large proportions before there was any legislative action placing it under regulation. When in 1917 the Legislature required prospective operators of motor trucks and buses to obtain a certificate from the railroad commission, the operative rights of existing truck and stage companies were expressly recognized and confirmed by that statute. When the jurisdiction of the commission was increased in 1919, a similar exception was made as to existing operators.

## HIGHER FREIGHT RATES WILL FORCE TRUCK USE

ATLANTA, Dec. 2—Leading sand and gravel dealers of the Southeast, testifying before the Georgia Railroad Commission here in the hearing for increased freight charges, declared that if rate increases are permitted the carriers, the sand and gravel industries of the State will have to use motor trucks entirely for transportation. The increases sought would make freight charges in excess of the value of the material if granted.

"At the time these laws were passed," says the commission's letter to Mr. Swayne, "automobile transportation companies were operating on the highways, and were paralleling railroad lines, and the confirmation of their operative rights indicates that the Legislature did not have in mind restrictions such as you suggest."

The commission further points out that it is acting within the limits of the power conferred upon it, and in accordance with the legislative will, adding: "Manifestly, if there is to be any change of fundamental state policy toward automobile transportation companies, such change must come through legislative action. Ultimately, the decision rests with the electors, expressing their will through their legislative representatives, or directly by means of the initiative."

The commission asserts that regulation of motor carriers has resulted in stabilizing the motor transportation business, and has prevented irresponsible competition with established carriers. "To obtain a certificate, an applicant must establish his financial ability to undertake the proposed service, and the obligations it entails, and must make an affirmative showing of public convenience and necessity," says the letter. "Public hearings, announced in advance, are held in all competitive territory, and great weight is given citizens and representatives of civic bodies as to the transportation needs of their respective and particular communities."

In conclusion, the letter calls attention to the fact that any discussion of motor competition with the railroads, must take into consideration the privately-owned automobile, of which there is one for every seven persons.

## Michigan Judge Permits Competition With Railways

GRAND HAVEN, MICH., Dec. 2—Bus and truck freight operators have a common right to operate upon the highways in Michigan until such time as the state legislature sees fit to change the laws regulating this business, according to a decision recently rendered by Judge Cross in the Circuit Court. This decision comes as a result of the complaint of the Grand Haven and Muskegon in which it asked for a permanent injunction to stop certain bus and truck operators in Grand Haven and Muskegon from operating.

An appeal is now before the Supreme Court and it will undoubtedly come up for hearing at the January term.

## Western Railroads to Use Mack Cars

### Northern Pacific and Great Northern Plan Motorizing of Short Hauls

NEW YORK CITY, Dec. 6—The use of steam equipment in rail transportation on branch line runs is gradually being supplanted by motorized carriers throughout the country. Railroad executives who have carefully considered operating costs, strongly believe that gasoline rail cars will effect a more vitally necessary saving—that of operating expense. The Northern Pacific Railroad has after a number of tests decided to operate gasoline equipment, a Mack rail car, in regular service on a branch line, and expects shortly to install more of this type in like and larger capacities.

Another large railroad of the West, the Great Northern, is also planning to install gas-propelled rail cars on its various branch lines.

In the East, the New York, New Haven and Hartford Railroad will soon operate three such rail cars. Many of the smaller railroads, such as the Narragansett Pier R. R., Aberdeen & Rockfish R. R., Sewell Valley R. R. and the Stone Harbor R. R. have been using gasoline equipment for some time.

## 26 Companies Included in Merger

NEW YORK CITY, Dec. 7.—Substantial progress has been made in the last few weeks in negotiations for the formation of the big automotive merger which will be known as the Associated Motor Industries, a Delaware corporation with a capital of \$80,000,000. The roster of companies which will be included now contains twenty-six names, embracing established companies not only in the parts field, but in the passenger car and truck branches of the industry. One of the purposes of the merger will be to assure the parts companies included a definite amount of business each month through the sale of the motor vehicles which will be controlled by the parent company.

## New York City Buys 87 Pierce-Arrows

BUFFALO, Dec. 5.—The City of New York has awarded to the Pierce-Arrow Company a contract for eighty-seven trucks. They will be heavy-duty trucks. Their total value will be \$350,000.

The order will place the production capacity of the company's truck department at about 100 per cent.

At present it is running a little above 90 per cent.

The trucks, according to Robert O. Patton of the company's sales department, are to be used by the department of streets, some of them in the city's snow fleet. Seventy-five of them will be equipped with flushing apparatus.



## 70 Buses Operating in Toledo

### Approximately 15,000 Passengers Carried Per Month— New Companies Formed

TOLEDO, Dec. 7.—Motor buses on Toledo streets are carrying approximately 15,000 passengers a month at the present time. There are nearly seventy buses in service. Many developments are expected in the next few months.

The Toledo Bus Transportation Co. has been incorporated and through it a

number of individual bus owners will become a part of a regular transportation system. This group will not seek to compete directly with street railways.

A fleet of six buses will soon begin operating a new bus line. The Monroe-Lincoln-Bancroft line which serves a territory not adequately served by street cars has also proved successful. The buses are regulated by the city, licensed, and required to furnish indemnity bonds.

Recently the Ace Motor Bus Co., of Newark, Ohio, put into operation one of their large 36-passenger buses on an interurban route between this city and Sylvania, a run of about 15 miles. It has proved so successful that the Toledo

& Western interurban serving the same territory is contemplating new and lighter equipment to meet the competition.

A number of other interurban bus lines are serving the Toledo territory.

### Trucks Prove Saving in Cotton Shipments

GRIFFIN, GA., Dec. 8.—Cotton in this vicinity is being transported to domestic mills with the aid of motor trucks at an average saving of approximately \$1 per bale, as compared with railroad freight charges, with the added advantage that deliveries are being made much more promptly.

## SYNOPSIS OF THE ANNUAL REPORT OF THE FIFTH AVENUE COACH COMPANY FOR THE YEAR ENDED JUNE 30, 1921

Fifth Avenue Coach Company (Controlled by the New York Transportation Company)

[N. B.—The figures given below are subject to such correction and revision as may be found necessary after a critical examination of the return, which will be published in greater detail in the Annual Report of the Commission for 1921.]

### Statement of Operations

			1921	Increase or (D) decrease
Number of omnibuses (exclusive of 50 non-revenue buses and autos) .....			289	18
Round trips made during the year .....			619,151	50,019
Revenue 'bus hours (incl. 2,865 "private hire") .....			1,123,277	22,342
Revenue 'bus miles (active 9,010,047; idle, 164,140; "private hire," 17,638) .....			9,191,825	395,630
Number of passengers carried, at 10 cents			51,091,365	8,538,656
	Per 'bus mile	Amount		
	1920	1921		
Total amount of fares .....	48.37	55.58	\$5,109,136.50	\$853,865.60
Revenue from livery service .....	0.33	0.16	14,607.70	D 14,104.80
Advertising privileges and miscellaneous .....	0.80	0.82	75,191.85	5,222.11
Total revenue from operation .....	49.50	56.56	\$5,198,936.05	\$844,982.91
Maintenance (a):				
Superintendence, \$86,418; shop expenses, \$27,288.44; repairs (omnibus bodies and chassis, \$476,725.27) ..	1.17	1.24	\$113,706.44	\$11,323.88
Tires (b) .....	0.98	0.87	506,071.79	99,833.02
Depreciation (reserved) .....	2.42	1.57	80,370.31	D 5,693.78
Total maintenance .....			144,502.57	D 68,505.66
Conducting transportation .....	9.18	9.19	\$844,651.11	\$36,957.46
Accidents and damages (c) ..	23.23	25.18	2,314,778.97	270,884.65
Traffic, advertising .....	1.35	1.87	171,585.79	52,929.49
General and miscellaneous ..	0.16	0.24	22,501.73	8,593.59
Total operating expenses ..	1.62	1.71	157,005.02	14,664.77
Taxes .....	35.54	38.19	\$3,510,522.62	\$384,029.96
Total revenue deductions ..	4.66	6.49	596,648.39	186,922.69
Total revenue deductions ..	40.20	44.68	\$4,107,171.01	\$570,952.65
Income from operations .....	9.30	11.88	\$1,091,765.04	\$274,033.26
Non-operating revenues (rent, interest, \$75,014.34) .....			\$93,222.62	\$18,208.28
Non-operating revenue deductions .....			15,654.72	14,979.60
Non-operating income .....			\$77,567.91	\$27,942.92
Gross income attributable to corporate and leased properties .....			\$1,169,332.95	\$301,976.18
Income deductions (rent, interest, \$567.54) .....			51,607.22	D 30,965.76
Net income for year .....			\$1,117,725.73	\$332,940.94
Surplus adjustments—net deductions ..			1,117,725.73	D 1,124,848.62
Net increase in corporate surplus .....			\$1,098,252.77	\$457,792.57

Employees: Last payroll of June, 1921: Conductors, 432; drivers 411; others, 478; total, 1,321. Total salaries and wages, \$2,416,930.93 (inclusive of officers, \$69,898.66), increase over 1920, \$367,248.80.

Accidents—Killed, 3; injured, 809 (serious 27, minor 782). (a) The rule of the Fifth Avenue Coach Co. concerning Depreciation of Equipment, filed with the Commission, provides for a charge to expense from Jan. 1, 1919, "equal to 9.15c per 'bus mile, which is estimated to be sufficient and necessary to cover such wear and tear and obsolescence and inadequacy as may occur on all equipment." The basis includes non-revenue mileage (30,290). The amount reserved after deduction, the cost of repairs comprises \$117,372.43 for depreciation of equipment, \$16,351.25 buildings and \$10,778.89, shop tools and machinery.

### Balance Sheet

	ASSETS		
	As of June 30		Year's increase or (D) decrease
	1920	1921	
Cash .....	\$339,436.51	\$344,555.92	\$5,119.41
Accounts receivable .....	38,665.71	227,913.37	189,247.66
Interest and dividends receivable .....	8,132.76	21,089.84	12,956.08
Materials and supplies .....	317,662.22	352,372.57	34,710.35
Total floating capital .....	\$703,898.20	\$945,931.70	\$242,033.50
Motor 'buses .....	\$1,235,537.66	\$1,353,235.24	\$117,697.58
Shop and miscellaneous equipment .....	174,764.68	207,579.50	32,814.82
Office furniture and fixtures ..	12,064.71	16,725.58	4,660.87
Organization .....	25,105.27	25,105.27	
Real estate .....	298,919.13	298,919.13	
Garage .....	817,561.81	817,561.81	
Total fixed capital—gross ..	\$2,563,953.26	\$2,719,126.53	\$155,173.27
Accrued amortization of capital—Cr. ....	716,845.24	(e) 824,098.21	107,252.97
Total fixed capital—net .....	\$1,847,108.02	\$1,895,028.32	\$47,920.30
Miscellaneous investments ..	\$1,032,669.13	\$1,953,323.88	\$920,654.75
Construction in process .....	84,621.39	2,915.55	D 81,705.84
Prepayments .....	38,461.09	43,445.28	4,984.19
Guaranteed cost of tires in service (see note "b") .....	29,676.56	14,232.67	D 15,443.89
Total assets side .....	\$3,736,434.39	\$4,854,877.40	\$1,118,443.01
	LIABILITIES		
Taxes accrued .....	\$417,361.89	\$535,166.21	\$117,804.32
Miscellaneous accounts payable ..	184,922.05	266,006.86	81,084.81
Working advances due to associated companies .....		4,166.67	4,166.67
Interest accrued .....	3,719.96		D 3,719.96
Funded debt (purchase money mortgages on garage) ..	175,000.00		D 175,000.00
Reserve for injury and damage ..	155,966.42	169,049.23	13,082.81
Other reserves .....	29,884.13	12,655.72	D 17,228.41
Capital stock .....	50,000.00	50,000.00	
Corporate surplus .....	2,719,579.94	3,817,832.71	1,098,252.77
Total—liabilities side .....	\$3,736,434.39	\$4,854,877.40	\$1,118,443.01

(b) Reported as Depreciation of tires. Based on the "bus-tire mileage" at the guaranteed tire cost per mile, credit being made for tires which exceed the guaranteed mileage and for scrap.

(c) For payment of claims the company charged expenses (and credited reserve) at the rate of one cent per 'bus mile until December 31, 1920, and thereafter at rate of 1½ cents. Credits exceeded the payments this year by \$13,082.81.

(d) Debts: Obsolete parts scrapped, \$12,513.96; adjustment of federal taxes for period January to June, 1920, \$4,574.38; 5 per cent of receipts from advertising from October 1 to December 31, 1919, paid to the City of New York, \$810.05; unamortized cost of equipment retired during the year \$156.81; loss on securities sold and matured, \$311.11; adjustment of items pertaining to prior periods, \$2,431.56; bad debts written off, \$124.25. Credits: Bad debts collected, \$266; unclaimed wages, year 1918, \$483.16.

(e) Depreciation of equipment, \$718,371.37; shop tools, etc., \$50,870.42; buildings, \$54,856.42.

(f) Reserve for depreciation of uniforms, \$2,251.75; for improvements to leasehold property, \$4,977.02; reserve for workmen's compensation, \$5,426.95.



## Overload Certificate Opposed by N.A.C.C.

### Chamber Characterizes Recent Ruling in Connecticut as Dangerous

NEW YORK CITY, Dec. 7.—Directors of the National Automobile Chamber of Commerce at their meeting today went on record as opposed to the overloading and over-speeding of motor vehicles. This action was taken in reference to the ruling made by highway and motor vehicle authorities in the state of Connecticut that any person desiring to register a motor truck for an increase over its load capacity must obtain from its engineering department a certificate to the effect that in the opinion of the manufacturer such vehicle is capable of being safely operated under all conditions when loaded to the increased capacity.

It is the conclusion of the Chamber that the giving of such certificates authorizing the loads in excess of rated carrying capacity of such motor vehicles under the conditions of such laws, is dangerous because of the contingent liability on the manufacturer in case of accident. Personal liability and property damage as well as claims under the maker's warranty for breakage and defects resulting from overloading authorized by such certificates are other points that bring opposition. The possibility of legislators seizing upon this overloading as a basis for further restrictive legislation and higher license fees was also considered by the Chamber.

### Re-establish Des Moines Trolley Service

DES MOINES, IOWA, Dec. 12.—The people in this city through a special election have confirmed the action of the City Council in re-establishing electric railway service. Motor buses were given an 84-day trial in this city and were permitted to operate without trolley car competition. A 5-cent fare was charged. Service, on the other hand, was inadequate to meet the transportation requirements. It is stated that there were but 100 buses and that the traffic requirements necessitated at least 500.

A franchise of the service-at-cost type has been accepted by the Des Moines City Railway. This franchise is granted for a term of 25 years. The haulage of freight, baggage, mail, express, etc., over the city tracks is authorized, under certain provisions. The initial fare is to be 8 cents cash with ten tickets for 80 cents. This fare will continue in force until there has been accumulated in the "fare adjustment fund" the sum of \$150,000. Thereafter the rate of fare shall be changed to next higher step whenever the balance in this fund shall be lower than \$100,000.

The city has agreed to cancel all licenses issued for the operation of motor buses engaged in carrying passengers on any street on which street cars are oper-

## SUGGESTS ONE-WAY HIGHWAYS IN CONNECTICUT

HARTFORD, CONN., Dec. 3.—Truck operators are much interested in the suggestion of the state commissioner of motor vehicles that one-way highways be built for motor vehicles as a means of easing up on congestion. The official points out that with the great increase in the number of vehicles on the roads, the need of additional highways is apparent. These could be built under a \$5,000,000 bond issue. A number of years ago private parties favored the construction of just such exclusive roads through the state, at private expense, and the project received endorsement on every side. However, when those interested requested a charter from the legislature, the railroad interests came to the fore and opposed the proposition. The commissioner pointed out that the end had been practically reached in motor vehicle taxation. The revenue for 1922 should be around \$4,000,000 from all classes of vehicles under the new scheme of registration. Truck fees, of course, are very much increased under the new law.

ated. Motor buses are permitted to cross such streets at right angles and in addition may travel over trolley streets as far as it is necessary to cross bridges. The buses may also have a terminus in the business district.

## New Highway Plan for New York

### Grade Crossings Would Be Abolished—New Route to Tap Important Sections

NEW YORK CITY, Dec. 5.—Intra-city shipments of freight in this section of the country are faced, according to Major Elihu C. Church, by two serious difficulties—the danger of accidents and high cost. Both are due to the necessary use of streets already overcrowded and unfit for motor truck traffic and of unlighted or badly lighted and unregulated country highways. Major Church, who is transportation engineer of the Port of New York Authority, has a new highway plan that is claimed will solve these difficulties and if adopted would cut highway transportation costs considerably.

He has laid out on paper a motor trunk line highway that is designed to have lighter grades and easier curves than those prevailing on most roads. This plan would eliminate all grade crossings. The highway would be equipped, just as railway systems are equipped, with convenient stations, supply depots, telephones and wrecking service.

It would always be under strict supervision, well lighted throughout, and its traffic handled on definite schedules, the regulations to be as rigid as those on the railroads.

Major Church has just presented his plan to the advisory board of the Port of New York Authority, consisting of Gen. George W. Goethals, F. L. Stuart, Morris R. Sherrerd and Nelson P. Lewis.

It appears likely that an entirely new system of roads will be suggested, though details of the plan are yet to be decided upon. The Boston Post Road and the Lincoln Highway already are so heavily taxed by passenger traffic as to be useless. It is likely that new roads will be demanded in the city. These must be either above or below street levels, according to Major Church.

As indicated by present plans, the roads probably would be built through the territory under the guardianship of the Port of New York Authority in such way as to permit further growth to cover three important sections: New York to Boston, tapping Connecticut and beyond Boston; New York to Philadelphia, thence to Washington, Baltimore and the South; and New York to Albany, passing through the Mohawk Valley and on to Buffalo.

Further plans include the establishment of several belt-line highways within the cities traversed by the main route, these crossing and connecting the trunk lines and circling the city streets in broad, sweeping lines. Devoted only to the traffic of the trunk line system these would complete the efficiency and the safety of the road by simplifying deliveries and keeping freight traffic off the city streets.

## Coming Events

- 1922
- Jan. 6-7, Columbus, Convention of Ohio Ass'n of Commercial Haulers, Hotel Chittenden.
- Jan. 19-25, Milwaukee, Wis., Truck Show, Auditorium.
- Jan. 30-Feb. 2, Boston, 6th Annual Conference of International Delivery Ass'n at Copley Plaza Hotel.
- Feb. 3-10, Minneapolis, Minn., Fifteenth Annual Automobile Show, Minneapolis Auto Trade Ass'n, trucks and accessories, W. R. Wilcox, Mgr.
- Feb. 4-11, Youngstown, O., Truck Show.
- Feb. 6-9, Scranton, Pa., Truck Show, Armory, H. B. Andrews, Mgr.
- Feb. 12, Madison, Wis., Truck Show, Cartwell Bldg. F. W. Moxley, Mgr.
- Feb. 11-18, San Francisco, Cal., Sixth Pacific Automobile Show, Exposition Auditorium, trucks and accessories, G. A. Wahlgreen, Mgr.
- Feb. 20-25, Duluth, Minn., Seventh Annual Show of Duluth Auto Trade Ass'n, Duluth Armory Bldg., trucks and accessories.
- Feb. 27-28, Bethlehem, Pa., Truck Show, Armory, J. L. Elliott, Mgr.
- Feb. 27-March 4 (tentative date), Atlanta, Ga., Second Annual Great Southern Automobile Show, auspices of Atlanta Automobile Ass'n, Auditorium Armory, Trucks and accessories, Virgil W. Shepard, Mgr. Chamberly Bldg., Snow, Mgr.
- March 11-18, Boston, Mass., Twentieth Annual Automobile Show of the Boston Automobile Dealers' Ass'n, Mechanics Bldg., trucks and accessories, Chester I. Campbell, Mgr., 5 Park Sq.



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Reg. U. S. Pat. Off.

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
 W. I. Ralph, Vice-President E. M. Corey, Treasurer  
 A. B. Swetland, General Manager  
 David Beecroft, Directing Editor  
 U. P. O. Building  
 239 West 39th Street, New York

## CONTENTS

Vol. XXV, No. 11

January 1, 1922

### LEADING ARTICLES

Automotive Transportation . . . . .	7
Editorial: Looking Ahead! . . . . .	33
Hints on How to Use the Specifications . . . . .	38

### TECHNICAL TABLES

State Laws Governing Motor Truck Regulation . . . . .	18
Changes in Trailer Registration Fees . . . . .	24

### TECHNICAL ARTICLES

Big Decrease in Truck Production in 1921 Only a Temporary Setback . . . . .	16
Trucks and Final Drives . . . . .	17
The Trend of Truck Parts . . . . .	25

### NEWS

Overloading Rare in Oregon . . . . .	34
Flat Trade-in Value Given Trucks . . . . .	34
Truck Resale Prices Discussed . . . . .	35
Road Costs Figured for Truck Taxes . . . . .	35
Would Connect Rail and Water Routes . . . . .	36
Parts Stations Under One Head . . . . .	36
Duplex Brings Out a New Rail Car . . . . .	37
Conference Held on Overloading . . . . .	37

### SPECIFICATIONS

Buyer's Specifications of Nationally Distributed Trucks on 1922 Market . . . . .	40-41
Buyer's Specifications of Electric Motor Trucks Offered on 1922 Market . . . . .	58
1922 Trailers . . . . .	60

Index to Advertisers . . . . . 122-123

## The Commercial Vehicle

Charles W. Blackman, General Manager

EDITORIAL DEPARTMENT

Sinclair Gluck, Managing Editor

F. Eugene Spooner, Technical Editor

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

Chicago, Mallery Building, 59 East Madison Street  
 Detroit, 317 Fort Street West, Cleveland, 536-540 Guardian Bldg.  
 Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States . . . . .	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law . . . . .	.50c
Canada . . . . .	\$3.00 per year
Foreign Countries . . . . .	\$4.00 per year

### ADVERTISEMENTS

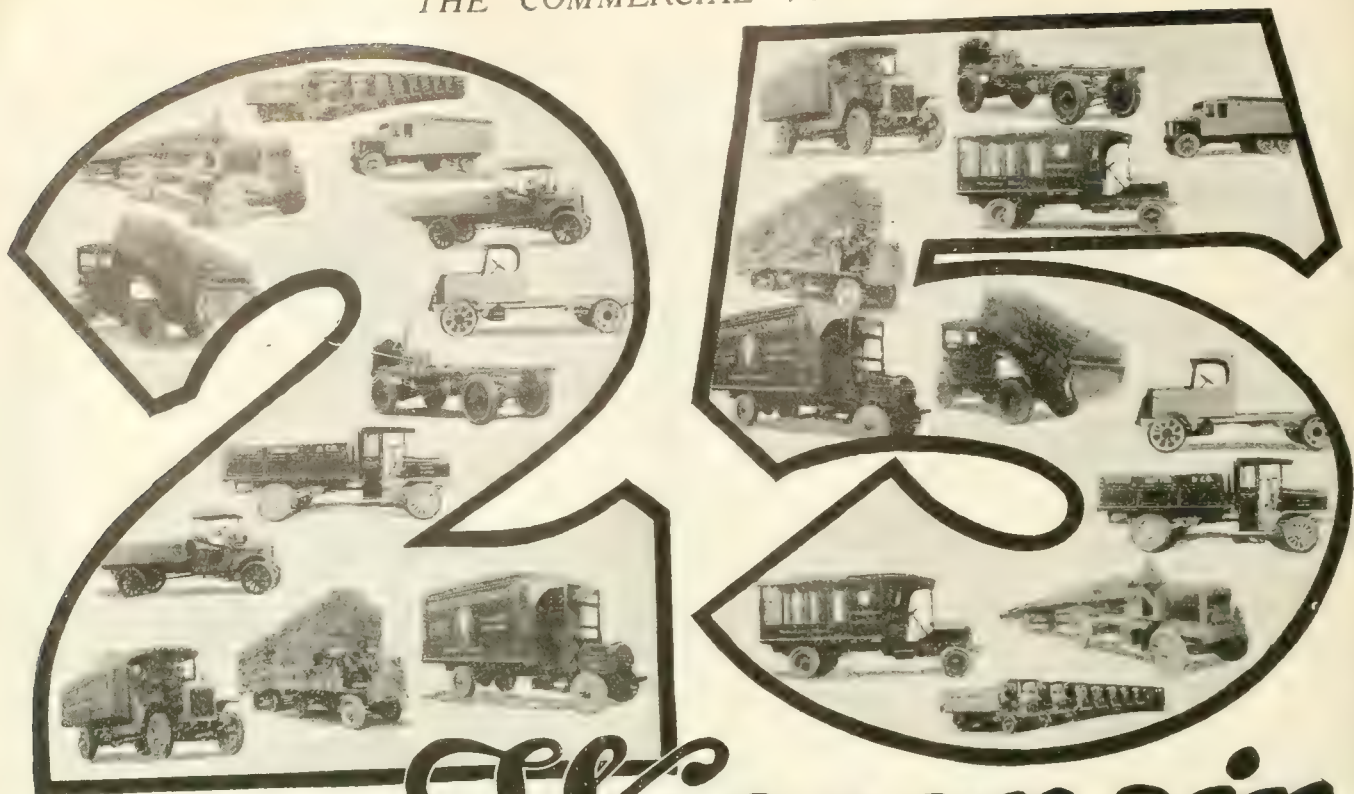
Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.



There is no  
Substitute -  
FOR

Wyman  
Gordon  
Quality  
and  
Service

**WYMAN · GORDON**  
*The CRANKSHAFT MAKERS*  
 WORCESTER, MASS. CHICAGO, ILL. CLEVELAND, OHIO



# Wisconsin

Consistent

## 25 Truck Manufacturers Have Standardized on Wisconsin

**S**TEADILY, inevitably, the Wisconsin has won its place as the foremost truck motor. Now twenty-five truck manufacturers have adopted it as standard. Back of them is the active preference of tens-of-thousands of dealers, owners, and drivers who *know* Wisconsin's stamina, power and *consistency*. Today the selection of Wisconsin motors by a manufacturer is a pledge of the quality that he is building into his product.

**WISCONSIN MOTOR MFG. CO.**  
MILWAUKEE WISCONSIN

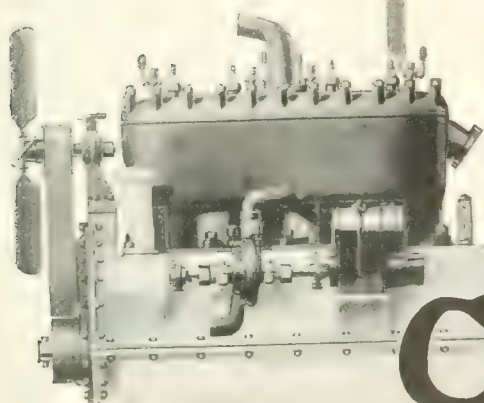
### DISTRIBUTORS

T. M. Fenner, 21 Park Row,  
New York, N. Y.

Wisconsin Motor Parts Co.  
2354 Cottage Grove Ave.,  
Chicago, Ill.

Earl P. Cooper Co.,  
Los Angeles, Calif.

Chandler Hudson Co.,  
Seattle, Wash.



# Consistent



# The COMMERCIAL VEHICLE

*Read by Fleet Owners*

Vol. XXV Jan. 1, 1922 No. 11

## Automotive Transportation

### *Past, Present and Future*

**A Survey of the Growth of Highway Transportation,  
Its Influence and Its Probable Future Development**

*By Sinclair Gluck*

**M**ODERN transportation followed three well-defined stages of growth. First came locomotion with the thought of expansion only. Second, when expansion had been accomplished, came distribution and industrial expansion. And, third, when industrial expansion had developed, came the specialization of transportation.

These three stages are shown clearly in the history of our own country. First came the early settlers along the eastern seaboard. These gradually moved westward pioneering. This was simple locomotion with the thought of expansion.

Later, when the great mass of the population became definitely located in cities and towns, came inter-city distribution. And with distribution by road, by boat and later by railroad, came industrial expansion.

Later still, but in part simultaneously with industrial expansion, came the specialization of transportation—that is, special forms of transportation for special purposes or *the development of transportation along economic lines.*

**T**HE first stage does not concern us here. In the second stage, goods were moved by whatever form of transportation was locally available and all goods were moved in that way in a given locality. But in the third stage, the present stage, certain goods are moved by railroads, certain goods by water and certain goods by road, from the same given locality (for in most cases all three, or at least two, of these transportation mediums are available), *because each form of transportation has its special advantages and disadvantages.*

Thus, waterways are ideal for moving certain goods of a non-perishable nature in bulk over long distances.

Water transportation is slow, but it can handle goods in large quantities, clumsily but cheaply.

The railroads can also transport goods in large quantities over long distances. This form of transportation is faster and therefore better for perishables. But it is more expensive also.


But some other form of transportation was needed—partly, but inefficiently, supplied by the horse—for moving smaller quantities of goods rapidly over short distances. Automotive Transportation supplied the need.

**A**UTOMOTIVE Transportation supplied the fingers for the arm of transportation. It perfected and completed the system. It took care of expansion and distribution in detail—that is, in small quantities—and it supplements, not supplants, the other forms of transportation.

At first, the automobile meant locomotion only, supplying private persons with a novel form of travel. Later, like transportation itself, it developed into special forms for different purposes—the automobile, the truck and the bus.

This specialization has meant the dawn of a new era—the era of road transportation—completing and rounding out of transportation as a perfected system.

*If the men in the many branches of the Automotive Industry are to fulfill their tremendous responsibility in developing this era, they must have a comprehensive vision, not only of the history of road transportation to date, but of the future of road transportation in our country. That is why, in the following pages, an attempt has been made to survey, in a brief form, the past, the present and the future of automotive transportation in the United States.*



# Transportation: Past,

## Development of the Motor Truck

### *Its Growth, Its Field and Its Future*

WHEN the motor truck first appeared as a definite commercial factor, the passenger automobile had already been developed to a state of considerable efficiency. Consequently, the first truck was much farther along the road to real efficient and economical designing than was the first automobile. For the first step in truck construction was merely an adaptation of the passenger car chassis to truck use and was a matter of changing bodies only.

Later, as the wide possible field of use of the truck became apparent, the truck engineer developed and the specially designed truck came into being.

IN the beginning, the electric truck more or less dominated the field, and there is still a very real and important field for the electric in short haul, city delivery work. The gasoline truck, in the number of designs and models and in total production, developed other fields, as well as competed with the electric.

The early gasoline trucks used one, two or four cylinder engines. Most of them were chain drive at first, like the automobile. Most of the early truck designs had a single field in view. For example, one concern which contemplated the manufacture of trucks investigated the delivery problems of a large grocery concern and then designed a truck as nearly as possible to suit the requirements of that concern.

But as the importance of motor truck transportation and its advantages over horse delivery became generally recognized, new designs, new capacities and improved bodies began to be manufactured. There was no attempt at standardization. More and more special trucks were turned out, designed for special fields; and the variations became legion. Until now, trucks vary in capacity from half a ton to 7½ tons, while tractor capacities range as high as 15 tons.

Standardization of design, limiting capacities to those most efficient and permitting greatly increased production at a lower cost per unit, has not fully developed as yet.

Trucks developed in other ways also. Vehicles were equipped with high speed gearsets for speed work and were mounted on pneumatics. Power take-offs were developed to operate winches and dump bodies. New and improved bodies were designed, greatly increasing the efficiency of the vehicle. And, finally, along parallel lines, came the development of the demountable body and the trailer and semi-trailer. These were different ideas with the same purpose in view—to reduce the idle time of a vehicle which involved a heavy investment.

But the development of the truck as a mechanism followed, to a great extent, the growth of the truck as a transportation factor, though not entirely along the most economical and far-sighted lines.

From the original experiments with a few vehicles in a few localities, the use of the motor truck increased throughout the entire country and in other countries with comparatively great rapidity. Within the last twenty years, trucks

have grown from an experiment to a national institution, essential to present-day distribution and to progress. And truck manufacture has expanded from a very progressive experiment on a small scale to a tremendous industry, giving employment to, and involving the life work of, hundreds of thousands of men.

The growth of such an important transportation factor has had very considerable effects upon community life, national economics, distribution of population, land values, commodity prices and industry generally.

First, consider the effect of the big increase of truck haulage on commodity prices, more particularly the necessities of life.

The population of the country is increasing by more than a million every year. The men who feed the population may be roughly placed in two classes: The big wholesale farmer, fruit grower, and truck gardener and the small retail planter. To feed our growing population, the number of these men should increase. But the area of land under cultivation must increase. In the same way, transportation facilities must increase in proportion.

There are three production costs for which the consumer pays: Material, labor and transportation. Material is a single first cost and varies only with business conditions.

Labor applies all along the line from the original producer to the consumer, varying slightly with business conditions. But transportation also applies all along the line, from the time the raw material comes out of the ground until it is in the consumer's house or office. Thus if transportation facilities are poor all along the line of production the ultimate cost to the consumer is increased enormously.

Such transportation facilities, aside from trucks, have not increased and improved in proportion to increased demand and increased supply. The railroads, through their very nature, are not sufficiently flexible to handle the increased flood of necessities, on a paying basis. And when transportation falls down, prices go up.

But motor trucks stepped into this breach between the producer and the consumer. On the one hand they took over the short haul, less than car load lot shipments, which the railroads cannot handle profitably without high charges. On the other, they gave both the large scale and the small scale producer a chance to market a certain percentage of his products locally, thus both increasing the supply on the mar-

#### The Broader Vision

No man can attain permanent, far-reaching success without a clear vision, wide in its sweep, of the ultimate aims of his industry.

This article attempts to give an insight into the fundamental meaning of Automotive Transportation.

For with a broader vision in the eyes of the men who are building this great industry will come clearer, better thinking, less wasted effort and a straighter course to our goal.

#### Have You Seen It?



# Present and Future

ket and reducing the retail prices.

There is another saving accomplished by trucks which applies to both large and small producers of necessities. Unless there is a shortage of certain foods on the market, it actually does not pay the farmer to ship all his harvest, when transportation costs are high. For if the market is well supplied by a bumper crop, the farmer often finds that it costs him more money to harvest his products and ship them to market than he can get for them at the prevailing prices. So, in many instances, he allows a certain percentage of his crop to rot in the fields or feeds it to his livestock. And such a procedure keeps up the price of his products on the market.

Motor trucks, offering a cheaper, quicker medium for placing these crops on the market, make it worth while for the farmer to ship his goods. This means more goods on the market and lower prices. The fact that trucks and trucks alone saved a big peach crop to the consumer last year is well known. And it is only one of many instances.

## Increased National Wealth

Motor trucks have increased the wealth of the nation as a whole, in two ways.

Trucks carry commodities to and from communities to-day which the railroads do not and cannot reach, on a paying basis. This means that there is a greater market for the country's products on the one hand, and that new sources of raw material are rendered available on the other. Increased production results. And increased production and consumption means increased national wealth.

Secondly, as trucks penetrate into territories hitherto untouched by the older methods of transportation, opening up new fields of endeavor and placing them on a paying basis, land values go up in proportion. This means increased taxation returns, both on the lands and on the successful businesses.

The San Joaquin Valley in California is an interesting example of this process. When irrigation first began in the district, the railroad ran through the town of Modesta, centrally located in the valley. When irrigation began, land within five miles of Modesta went up to \$1,000 an acre in value. But as distance from Modesta increased, land values decreased, although the land was just as fertile, because goods could not be transported to the railroad on a paying basis by horse team and the railroads could not come and get the goods. At thirty miles from Modesta, land was worth about \$50 an acre and was assessed for taxation at \$25 an acre.

But when the industrial truck appeared in the valley, land beyond the five-mile radius began to go up in value, until now, land thirty miles from Modesta is worth about \$1,000 an acre and is assessed at about \$500 an acre.

That land, then, is paying twenty times as much in taxes to the Government as it paid before trucks came into the territory, to say nothing of the increased income taxes paid by the prosperous owners of the land.

## Industry Stimulated

Throughout the country, motor trucks have extended the radius of shipments of foodstuffs and other necessities to market on a paying basis. Throughout the country, the increase in the use of motor trucks has greatly extended the field of the consumer of nationally distributed articles. And throughout the country, the motor truck has extended the distribution radius of goods manufactured locally and sold locally.

## The Motor Truck

There are in the United States to-day 284 cities with a population of 25,000 and over. In these cities is located 80 per cent of all business except agriculture. And motor trucks have had a remarkably stimulating effect upon all businesses in these cities. For they made possible and therefore brought about a tremendous expansion in this field.

On the one hand, the increased field of the general con-

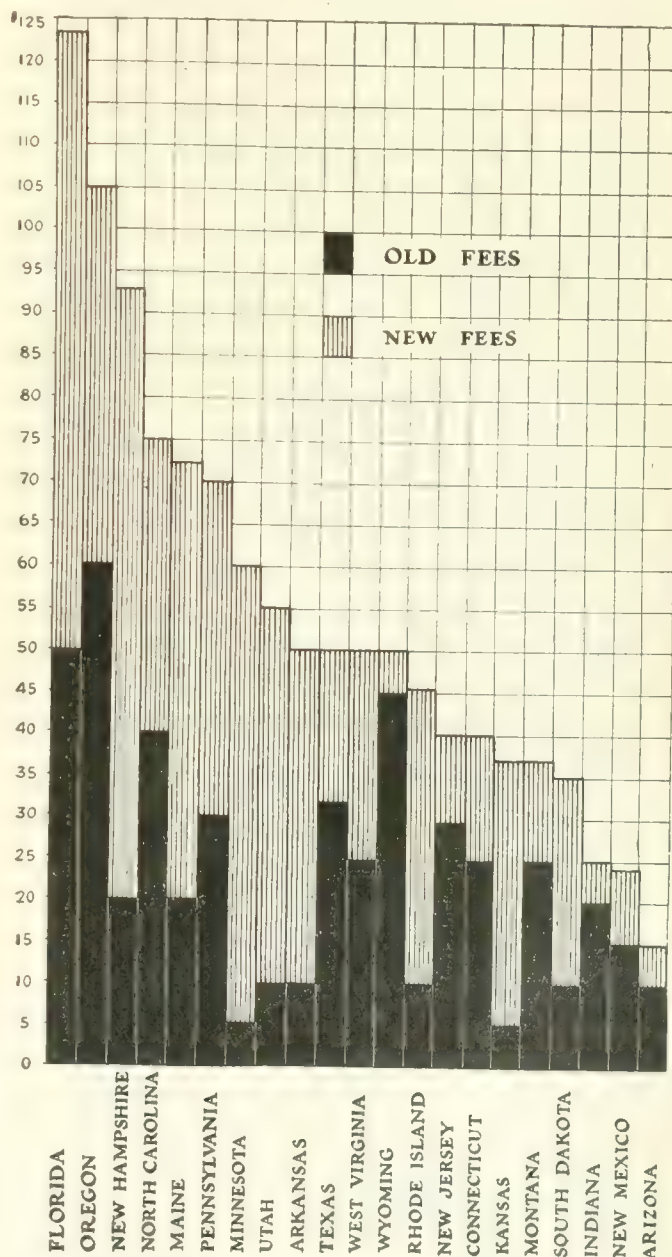


Fig. 1—Chart showing the increased cost of registering a 2½-ton truck in the various states in which new laws have been enacted increasing registration fees. The chart is based on the assumption that the truck is of 30 hp.; has a chassis weight of 5000 lb.; body weight of 1000 lb.; a gross weight of 11,000 lb. The above table is prepared from data very kindly furnished by the Motor Vehicle Conference Committee



# Transportation: Past,

sumer has stimulated the production of the nationally distributed article. On the other hand, the greatly expanded local zone of profitable delivery and profitable sale has stimulated the manufacture of locally distributed articles, increased sales, created new demands, through a general refinement of living conditions, and so on, through an ever widening circle.

Of course, periods of business depression cause a slackening of industry as they have always done and always will do. But other things being equal, the truck has been a boon to the manufacturer, to the farmer and to the general public. For it has stimulated both demand and supply at one and the same time.

Motor trucks have played a large part, also, in bringing the country the boon of improved roads. The motor truck has brought the dawn of a new era—the era of highway transportation. But highway transportation involves not only trucks, but good roads on which the trucks can be operated economically. And the development of the one is bringing the other—slowly but surely.

There are, to-day, approximately 2,200,000 miles of public roads in the United States. Of this total, only about 156,000 miles are at all improved. And one quarter of one per cent of the total road mileage, or less than 6000 miles, can be said to be so constructed as to be capable of sustaining heavy road traffic. This is only a beginning. But it is a beginning.

The era of better roads is in its infancy. But it is growing fast. Test roads are being built in various parts of the country to estimate the best type of road bed and sub-grade for heavy traffic. There is one such test road in California, built in the form of a race track and made up of thirteen different sections of different types of sub-grades, etc., which is even now in process of demolition by forty trucks, operating constantly.

The National Government is now committed to a definite program on a large scale, of improved highway construction. Congress has voted many millions of dollars to this work. And not only is the demand for good roads sweeping the country, but there is an equally widespread demand that roads be made heavier, wider and smoother, for motor trucks. Motor trucks have brought about this demand.

With the coming of hundreds of thousands of miles of good roads, the use of motor trucks will increase and expand throughout the country. And in the train of the trucks will come all the benefits which trucks have already begun to bring to industry and to the nation generally.

## Better Roads Mean Progress

But there is a reverse side to this picture. For poor roads, of which we have a very large mileage, are holding back the expansion of trucking and so holding back the expansion of business and industry generally. And every blow at the movement to build better roads is a blow at the progress of the country. For industrial progress is now closely and permanently linked with highway transportation.

A survey of the field of trucking activity shows an amazing variety of uses to which trucks are now put. All along the line, trucks are replacing the horse in almost every field of activity. Very small trucks are making all kinds of local delivery and suburban delivery, requiring speed and handling light goods. They are making retail deliveries for almost every kind of retail house in business.

Larger trucks are making collections and deliveries, hauling for construction work, building roads, serving as repair vehicles, fire engines, hearses, etc., and operating in almost every field of business, in cities, towns, rural districts and virgin territory.

## The Motor Truck

Still larger trucks, with or without trailers or semi-trailers, are collecting huge volumes of foodstuffs from rural regions, collecting wholesale goods in large quantities and acting as door-to-door express lines for freight between cities. The field of the truck has already expanded to huge proportions in variety of uses. It has still further to expand, both in volume and in kind.

Ever since 1914, the production of trucks has increased yearly by tens of thousands of vehicles. As the immense value of trucks, reflected in this increased output, became more generally appreciated, the number of concerns placing trucks on the market also increased very greatly—and within the last few years. But there is an interesting point in connection with this increase in the number of firms producing trucks. While the number of truck manufacturers who assemble trucks, using various makes of major parts in their products, has greatly increased, the number of concerns which manufacture the major parts in their trucks has not increased during the last few years. This does not, of course, refer to production, but only to the number of concerns in operation.

Again, while the manufacturers seeking nation-wide sales have decreased in number, many of these former nation-wide manufacturers now look only for local sales or city sales. And to these must be added a number of new manufacturers who are manufacturing for local distribution only, which has materially increased this class of manufacturer all over the country.

## Production Last Year

As regards 1921 truck production, accurate figures are not yet available. But according to present indications, production will show the first year-to-year drop since the truck became nationally used. While production in 1920 was well over the 300,000 mark, a conservative estimate of 1921 production places the total at about 200,000 vehicles. This decrease is partly due to business conditions and partly due to the large number of army trucks thrown on the market by the Government. But it does not reflect any waning interest in, nor decreasing value of, trucks in business and in industry.

No survey of the truck industry would be complete without a glance at the tremendous growth and expansion of industries allied to truck manufacture. There are many huge industrial plants manufacturing rear axles, engines and other parts for use in trucks and in trucks only. There are many big plants manufacturing smaller parts and accessories for trucks on a large scale. And there are many manufacturers of equipment used in connection with trucks.

Then there is the huge nation-wide network of truck distribution, employing tens of thousands of men, to say nothing of the nation-wide network of repair and replacement stations and agencies.

Finally, the use of trucks on a large scale has produced the contributive businesses: Designing engineers, highway engineers, transportation engineers and trade magazines, all contributing directly to truck production. There are also the manufacturing associations, employing many men.

The question of truck distribution is still open. Various plans have been tried in various ways. We have tried national distribution through dealers and through branches; local zone distribution direct or through branches or agencies; and at least ten manufacturers are now distributing by direct-to-consumer methods. The merchandising of trucks has by no means reached its ultimate, static state.

As yet, the biggest field for the truck undoubtedly lies in collection and delivery work for manufacturing and mer-



# Present and Future

## The Motor Truck

chandising houses, which operate trucks as a separate department of their business.

But the freight hauled by trucks has been variously estimated at from 5 to 20 per cent of the nation's haulage. And the development of such a volume of business has brought into being the business man *devoting his time and energies to truck haulage and nothing else*. Such business men must of necessity make a business and an efficient business of truck transportation because their profits depend upon efficiency, while all other business men operating trucks may do so inefficiently and still continue their main businesses.

Thus we now have the commercial hauler, operating trucks in all parts of the country. The commercial hauler sells transportation, in the city and between the cities. And he has developed transportation salesmanship.

Like the manufacturer and the dealer, the commercial hauler also has his associations, furthering and protecting his interests. And these associations have done something to further plans for better freight distribution and better terminal facilities.

The question of haulage charges is still unsettled. But associations of haulers and of warehousemen are already on the road to a standardization of haulage rates, similar to the standardization now in vogue on the railroads.

## The Legislative Angle

The path of the truck to the pinnacle of nation-wide use has been a thorny one. It has had to fight its way tooth and nail against criticism, just and unjust. And it has had a deal of hostile legislation to contend with.

It has been accused, sometimes justly, sometimes unjustly, of destroying the roads. But whether just or unjust, if the roads are destroyed by trucks, the fault lies mainly with the roads. Trucks are too important a national asset to be eliminated because the roads give way under them. If the roads will not stand up under truck traffic, we must build better roads. For the truck traffic has come to stay.

On the other hand, overloading of trucks to an extent destructive to both the vehicle and the road on which it operates has been extensively practiced. This must and will be stopped, either through direct action of trucking associations or through legislation.

The cost of registering trucks has also gone up in many States, principally because of the agitation against trucks over road wear. This increase in registration cost is shown in tables elsewhere in this issue. But the present situation has led to the proposal of a uniform vehicle law, the plan of which is illustrated in this article.

The value of the truck as a national asset can best be illustrated by a reference to three facts: The total freight handled by trucks in 1921, the work of trucks during the war and the importance of trucks during the recent railroad crisis, when their potential value might well have developed into an actual and indispensable value which would have saved the situation. It might be said that trucks actually did save the situation, because their readiness to handle the supply of necessities to large cities prevented what might otherwise have amounted to a hold-up by the railroad employees. As to the amount of freight handled by trucks, this has been estimated at about 1,200,000,000 tons of freight in a single year. And the work performed by trucks during the war feeding the military machine is still too fresh in the minds of everyone to need amplification here.

In a consideration of the future of the motor truck, four main heads naturally suggest themselves: Models and prices, manufacturing, distribution and operation. What will be the future development in models and prices?

As to models, the present wide variety includes trucks of less than  $\frac{1}{2}$ -ton,  $\frac{1}{2}$ -ton,  $\frac{3}{4}$ -ton, 1-ton,  $1\frac{1}{4}$ -ton,  $1\frac{1}{2}$ -ton, 2-ton,  $2\frac{1}{2}$ -ton, 3-ton,  $3\frac{1}{2}$ -ton, 4-ton, 5-ton, 6-ton,  $6\frac{1}{2}$ -ton, 7-ton and  $7\frac{1}{2}$ -ton capacities.

In this wide variety of models there will be certain ones which will prove to be the ultimate efficient capacities. Thus the future will probably see a concentration on two or three models, possibly the 1-ton, the  $2\frac{1}{2}$ -ton and the 5-ton models.

Lower prices are already the order of the day. According to a recent analysis, prices have been reduced on 298 models between Sept. 1, 1920, and Nov. 15, 1921, the reductions varying from \$1,725 down to \$20 per truck. In the same period, prices have been increased on 63 models, the increases varying from \$875 down to \$5 per truck. And the future decrease in the number of models should still further reduce prices, through quantity production.

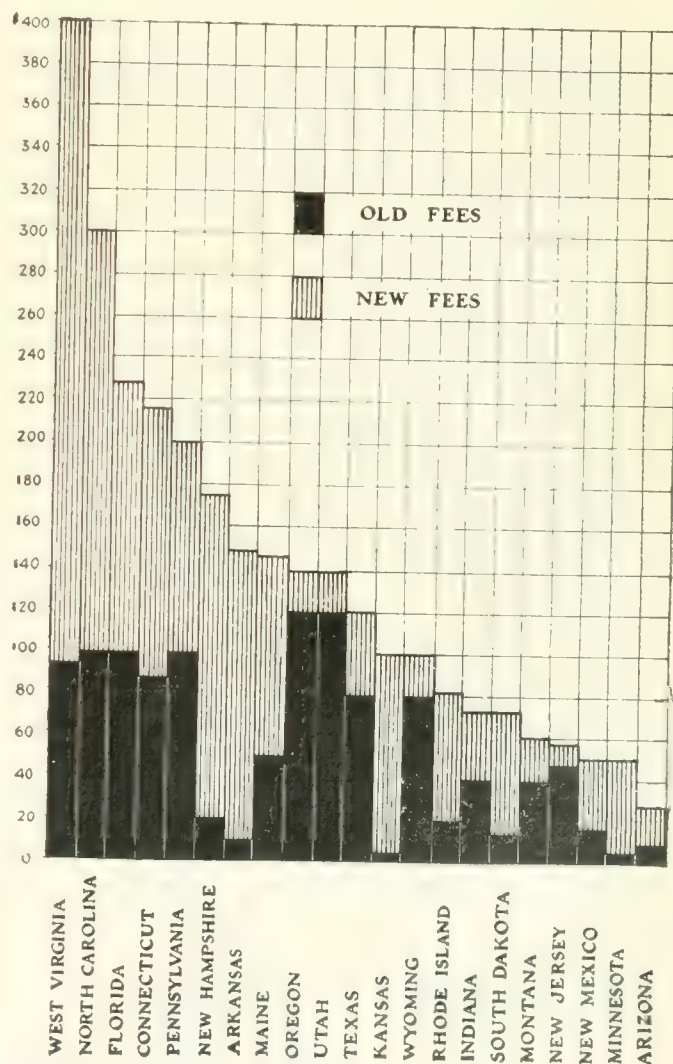


Fig. 2—Chart showing the increased cost of registering a 5-ton truck in the various states in which new laws have been enacted increasing registration fees. The chart is based on the assumption that the truck is of 36 hp.; has a chassis weight of 9000 lb.; body weight of 1500 lb.; gross weight of 20,500 lb. The above table is prepared from data very kindly furnished by the Motor Vehicle Conference Committee.



# Transportation: Past,

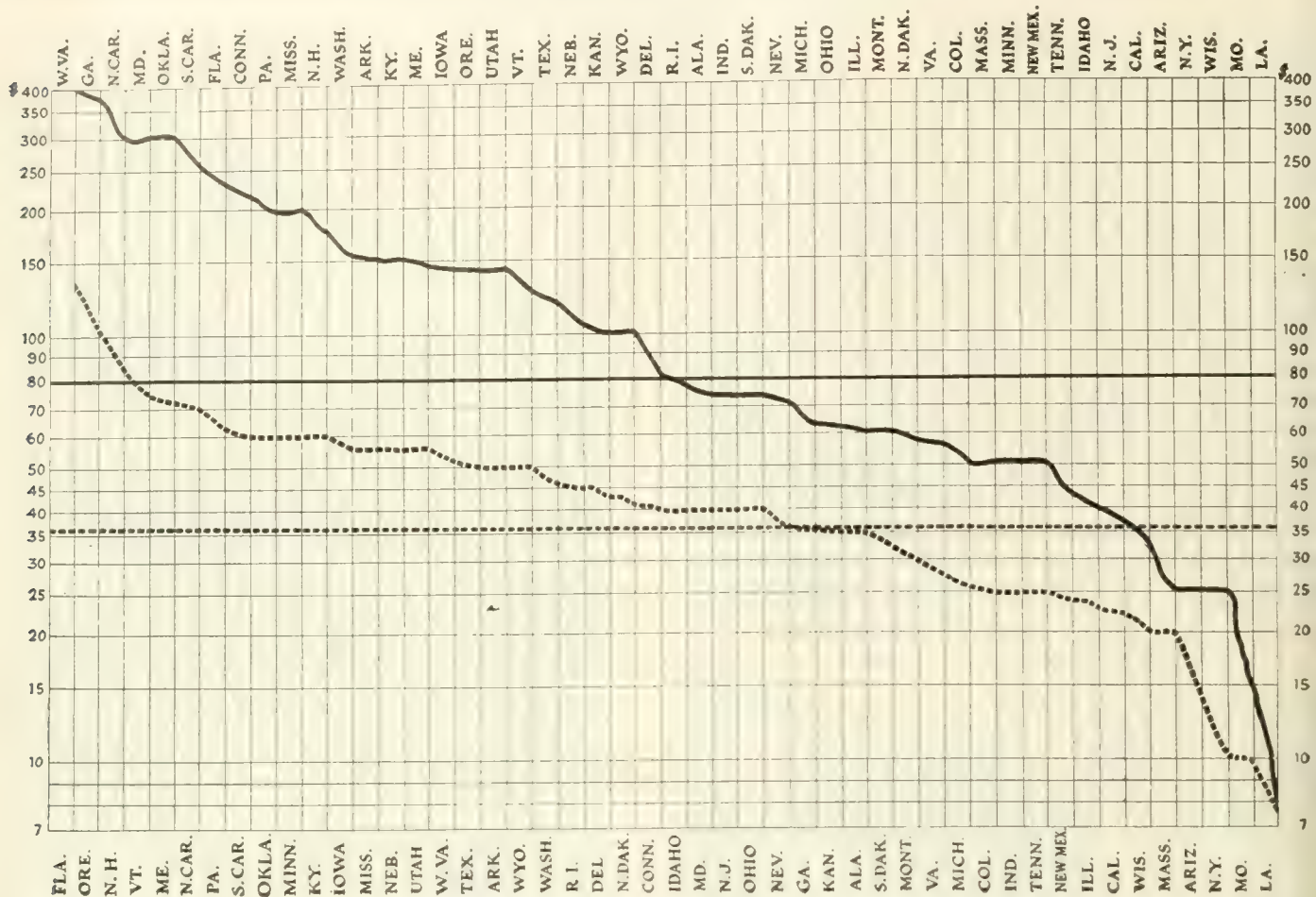


Fig. 3—Chart showing the cost of registering the typical 2½-ton and 5-ton trucks in the 48 states under existing laws. The heavy curve indicates the cost of the 5-ton truck, while the dotted curve indicates the cost for the 2½-ton. The straight lines represent the cost of registering each truck under the Proposed Uniform Vehicle Law. The above table is prepared from data very kindly furnished by the Motor Vehicle Conference Committee

Manufacture and distribution must be taken together, for they are inter-dependent. As already stated, the number of manufacturers, looking toward local distribution only, has materially increased. Manufacturers who make their own parts have not increased, in number. While other manufacturers, catering to nation-wide distribution, have materially decreased in number. This would indicate a tendency toward concentration on local, State or zone distribution only.

The number of manufacturers catering to nation-wide distribution has already been cut in half since 1920, being reduced from about 205 to about 100. The future may show only two classes of manufacturer: The very large manufacturer, selling trucks in great quantities, and the local manufacturer, catering to a local zone only.

Lastly, there is the future of truck operation.

The truck manufacturer is selling the means of highway transportation to-day. He is vitally interested in that transportation. And there are indications already in the industry that the manufacturer of the future may sell not only trucks but transportation. That is, he may manufacture and operate his trucks, handling freight haulage for industries on a cwt., ton or ton-mile basis. This may be accomplished through subsidiary companies.

There is also the probability that trucking may become of equal magnitude with railroad transportation. That is, truck freight may be handled by single corporations, operating

thousands of trucks. The entire country may be mapped out into zones in which these companies operate, forming a complete, nation-wide network of automotive transportation. Some of the big financial and industrial minds of the country already see such a development in the near future. A glance at the American Railway Express Co. or the United States Trucking Corp., both of which concerns operate or control vast fleets, indicates the course which this development may take.

As to totals, there are approximately 1,000,000 trucks operating in the United States to-day. They have proven the practicability and economy of automotive transportation. With better road conditions and more systematic methods of operation, old fields will be extended and new ones opened, for truck transportation. Thus, a prediction of 5,000,000 in operation in this country in 1927 can be visualized.

Present production facilities provide for an output of 500,000 trucks per year. With increasing demand will come expanded production facilities, until the above mentioned total can be easily attained.

But whatever developments the future may hold for trucks and trucking, the truck has come to stay; the truck has a great future; and it will be the men in the industry who are on their toes to foresee coming developments who will find their business houses built on a rock, when the industry approximates its static state.



# Present and Future

## Development of the Motor Bus *Its Growth, Its Field and Its Future*

**J**UST as the automobile had reached a high efficiency of design before the motor truck began to develop, so the motor truck had attained a wide variety of design, of model and of use before the motor bus was seriously considered as a nation-wide transportation factor.

The original truck was simply a goods body on a passenger car chassis. Later the developments of the truck were, for the most part, developments of passenger car parts with a special eye to truck requirements in the new field of the latter.

**I**N the same way, the original bus was and for the most part still is a bus body mounted on a truck chassis. Such changes as have been made up to date are, for the most part, developments of truck parts with a special eye to bus requirements.

At present, the special bus chassis is in an experimental stage. With certain exceptions the manufacture of buses has been in the hands of the truck manufacturers and the sale of buses has been a side issue of their business. Naturally, the manufacturer has sold the chassis which he has on hand rather than design a new model for bus use. In some cases the truck chassis has proved serviceable for bus use. In other cases it has not.

To some extent the truck manufacturers have experimented with a wider, lower chassis for bus purposes and with other variations from the truck chassis. But parallel with the manufacture and sale of truck chassis, or slightly modified truck chassis, for bus purposes, has been the development of an ideal bus chassis by the bus interests.

The biggest and best known bus company in the United States is the Fifth Avenue Coach Co. Back in 1904 R. W. Meade, who was at that time president of the Fifth Avenue Coach Co., went to Europe and selected the DeDion-Bouton bus chassis. This design was used by the Fifth Avenue Coach Co. until 1915 when the company began building its own buses, for its own use. This model had practically the same design in chassis, gear box and clutch as the DeDion-Bouton. And quite recently a big bus company has announced the fact that it is now manufacturing buses for sale to other companies.

Although the bus is still closely linked with the truck as to chassis, it has developed more extensively along its own lines as to types of bodies and capacities of bodies.

The different types of motor buses now in use on the streets and highways can be divided roughly into three classes. First, the highly specialized big double-decker for use in big cities, where the traffic justifies a carrying capacity of 50 passengers or more. Second, the smaller, single-deck bus for crosstown runs, for urban and interurban runs, for use as street car line and railway line feeders and for hotel-depot work. And, third, the sight-seeing bus.

At present, the first type of bus is in use in only three cities in the United States, although it is used much more extensively in England. The Fifth Avenue Coach Co. operates 265 buses of this type in New York City. These buses

accommodate 44 and 47 passengers. The Fifth Avenue Coach Co. has recently installed a new type of bus which is lower built and which accommodates 51 passengers. The Chicago Motor Bus Co. operates 50 double-deckers in Chicago. This company has also added a new type of double-decked bus recently with the upper deck inclosed. The older type accommodates 51 passengers; the newer type, 60. Finally, the Detroit Motor Bus Co. operates 70 double-deck buses in Detroit.

These buses accommodate 48 passengers each.

The second class of bus is much the largest. It includes vehicles of capacities ranging from 12 up to about 30 passengers. The bodies of these buses vary in arrangement, some having cross seats like a railway car, some having forward and aft seats like a closed street car and some being equipped with a combination of these two types. In this class of vehicle there are variations of design also. The vast majority of this class of bus for public passenger service are one-man operated vehicles, with the entrance and exit door on the side, near the driver's seat. The fore and aft type of design seems most popular, especially for work in districts where traffic is heavy at certain hours, because this arrangement of seats leaves more standing room.

The third type of bus, the sight-seeing bus, is usually an open vehicle, with the seats running from side to side and with doors on either side for each seat. These are built to accommodate from 20 to 40 passengers. They are used in large numbers in New York City, in Washington, D. C., and in California. But a good deal of jouncing and discomfort to passengers is one of the draw-backs of a motor bus body extending far beyond the rear wheels. And the sight-seeing bus is usually of this type.

The sphere of usefulness of the motor bus is already an extensive and a varied one.

The motor bus has its place in the large city where it can supplement street car and underground transportation and relieve congestion.

It has its place in the small town, where it can supply transportation facilities to passengers too limited in number to justify the installation of a street car line.

There is a big sphere for buses in suburban districts, both as transportation lines to and from the shopping and marketing districts of the nearby city and as a supplement to street car lines. In the latter case the buses act as feeders, bringing the passengers from outlying districts to central



### The Far Horizon

With the tremendous growth in the use of trucks, the field of Automotive Transportation expanded to immense proportions.

But with the recent coming of the bus, we have attained a higher eminence and we can see still farther into an ever-widening field.

Let us drop the details for a moment and look out to the horizon.

### It Is a Stimulating Vision





# Transportation: Past,

points, where their numbers make a street car line a paying proposition.

Finally there is the inter-urban field, where bus lines connect small towns in a net-work of transportation. This is a peculiarly valuable field for buses, because there are many such towns from and to which there is too little passenger travel to justify the more expensive installation of an inter-urban trolley line.

Lastly, there is an inter-urban field for the bus in connection with freight transportation. This is shown by the success of the Tidewater Lines in southern Maryland. This concern operates both buses and trucks, taking care of both passenger and freight transportation throughout a big territory heretofore served by no modern transportation system.

Like the truck, the bus has proved and is proving a national asset. It, too, has made for better roads, because it cannot operate efficiently over very poor roads. And by linking up isolated districts with towns and cities it has increased land values for sites for suburban homes and has brought many shoppers to the towns. This in turn has increased sales and industry generally in small towns and cities, by bringing to the shopping districts outlying settlers and farmers who previously ordered their purchases from big mail-order houses—or went without.

Curiously enough, buses will also have a considerable future influence upon education, an influence which is already making itself felt. In rural districts where there were no transportation facilities, we formerly had tiny rural schools dotted over the country-side, sometimes a school to each village. This meant a multiplicity of teachers, who were poorly paid and accordingly inefficient. But bus transportation has promoted and is still promoting the larger rural school, centrally located, to which school children are brought by bus from all the surrounding districts and villages. This means fewer and better teachers and better education in consequence.

The bus can never replace the street car altogether, for its function is to supplement, not supplant, the street car. But it has had a salubrious effect in several instances in improving street car service through competition. The passenger transportation of the United States, for short haul work, is still in a fluid state. When it solidifies the street car line and the bus will each have a place and a clearly defined place. In the meantime, there is competition. This has meant a certain amount of confusion, friction and duplication of effort. But the effect of bus competition on street car lines has been good rather than bad in that it caused street car lines to improve their service in many instances in their fight to retain their place in the public regard, and gave the public a new idea of what transportation may be.

In many instances, the bus has also relieved congestion and real hardship for the traveling public.

The principal advantages of the bus, in comparison with the street car, are two: Cheapness of installation and flexibility. In certain districts and under certain conditions, these are outweighed by the advantage which the street car possesses, in its ability to carry more passengers. But in other instances the advantages of the bus outweigh those of the street car. And in these last, the bus will eventually be established.

This fact has led to an interesting development. The

## The Motor Bus

street car lines in certain districts, unwilling to give up their overhead wire installation, but recognizing the advantage of flexibility, are installing trackless trolleys. These are buses mounted on pneumatics but operated by electricity from an overhead trolley.

These installations have been tried out in various parts of the United States and England, notably in Tees-side and York in England and in Staten Island, New York, St. Louis, Mo., and Richmond, Va., in the United States. Where the overhead wires and power houses are already installed, these may be cheaper than gasoline buses to operate, although, if depreciation on this equipment is taken into consideration, even this is doubtful. But the principal argument against this type of equipment is that, while it permits a certain amount of flexibility in passing other traffic and can drop its passengers at the curb instead of in the middle of the street, it is still tied, by the overhead wires, to a certain route. Thus a parade or a fire can tie it up like the street car. And a shifting or a development of population can leave it high and dry, like the street car.

Another interesting development, and one which has taken exactly the opposite tack is the flanged wheel bus, designed to operate on tracks. In certain cases this also has its value, in that it is cheaper to operate than a train of cars and can take care of the passenger and freight traffic on a little used branch line railway with a short run.

In the opinion of the writer, both these developments will be restricted in their use and while they have their value in isolated instances, they will not be of material influence on the transportation problem.

The future of the bus in transportation has already been indicated by its present development. Such further development as there will be, will probably be along the lines of better design rather than of different use. The bus will be more extensively used than at present, but it will be used in much the same way as at present. Future changes will be changes in design rather than in application.

In the opinion of the writer, the average truck chassis is not ideal for bus work. The truck chassis is too high. It has too short a wheelbase and too narrow a tread. And a better spring suspension for bus purposes can and will be designed than that with which trucks are now equipped and which is highly suitable to truck work.

However, this article can best be concluded, perhaps, by quoting the opinions of automotive manufacturers themselves on this subject, and on the subject of future bus business in general.

Lon R. Smith, vice-president of the Midwest Engine Co. gives the following views, in a letter: ". . . The power plant with which a bus is equipped must have in addition to high torque and power ability, a much greater speed range than is ordinarily available, so that the gear ratio may be low enough to pick up the load quickly and still provide sufficient speed in high gear to meet the schedule demand.

"In a 25-30 passenger bus for city work, an engine developing 39 horsepower with a gear ratio of 9 or 10 to 1 has been found to give exceptional service, including long life and economy. The same size bus for country work requires an engine developing not less than 47.5 horsepower, with a gear ratio of 6 to 1.



# Present and Future

"A four-speed transmission, in our judgment, is much better adapted to bus requirements than a three-speed type."

A prominent motor truck axle manufacturer writes as follows:

"We believe that the volume of motor bus transportation and its possible expansion are tremendous, and will grow with the increase of good roads until we have inter-town connections between all of the more important towns and villages in the country.

"We believe there will be, in a general way, three types of buses: One for strictly city use, with low, wide bodies and second stories; larger inter-city buses of about 30 to 36 passenger capacity; and smaller buses for inter-town or town work in small communities, this last type to have a capacity of from 12 to 16 passengers.

"There are certain changes in chassis design necessary and the present types of motor truck chassis are not satisfactory in their entirety for motor bus work. The motor bus must be built closer to the ground, with a liberal width of body and a better spring suspension. The high speed pneumatic work places a greater strain on all of the units entering into the construction of the bus than is the case in the ordinary motor truck, and in designing motor buses this must be taken into consideration, as well as construction which will enhance the safety of the passengers. For instance, in the axle construction more generous brakes must be provided; and axles of the full floating type should be used so that shaft breakage will not endanger the lives of the passengers."

## The Question of Speed

A letter from the Pierce-Arrow Motor Car Co. may be quoted on the question of speed, etc.: "We are thoroughly convinced that the future of the motor bus is positively assured and this fact is based upon the investigations which we have made concerning the use of buses by the steam and electric railroads and also private transportation companies. In each instance where buses have been installed, the results have far exceeded our expectations. The buses which we installed at Albany are in operation 17 hours a day consecutively and each bus handles between 750 and 1000 people at a 6-cent fare.

"... We feel that a speed of 25 miles an hour is all that is necessary to handle any city traffic, and if such a speed is used in suburban districts, the same volume of people can be handled at a far less depreciation of the vehicle."

Fuller & Sons Manufacturing Co. make some interesting points: "We believe that in the smaller cities up to 40,000, bus service will predominate, but as cities grow larger there will be both buses and electric service. . . . There is a great future for the motor bus in inter-city runs. . . . As the bus lines prove their stability there will be a greater number of city people who will have their homes in the outskirts of the city, as in instances where interurban lines run out from the cities."

On the subject of future bus types, the Walker Axle Co. has this to say: "The future motor bus resolves itself into two general types, according to our estimation: One, the large bus carrying approximately 55 passengers, possibly double-deck, to handle traffic in thickly populated districts where short-haul, frequent-stop business will be found; the other, the general type, will be the light, high-speed bus with possibly 20-28 passenger maximum capacity, equipped with pneumatic tires, to handle express service in the city, rural school service and inter-city service. In both these types of motor bus the equipment will certainly have to be of special design.

"In the case of the large bus, axles will have to be of

## The Motor Bus

such a nature that the center of gravity of the truck unit will be brought as close to the ground as possible. The tread or track of the axle will have to be considerably wider than at present."

According to Walter E. Parker, president of the Commerce Motor Car Co.: "The fast growing use of motor bus transportation gives promise of phenomenal development during the next few years. These years will see the foundation of fortunes laid that will compare with those which accompanied the development of the interurban traction lines.

"The motor bus transportation business, however, has this added attraction. Motor bus transportation is open to the man with limited capital as well as the millionaire.



Above—Type of town and inter-urban bus

Below—Type of city bus for congested districts

"We have before us the records of a motor bus company, with an investment of \$30,000 operating four motor buses, that is earning 70 per cent for its stockholders, in addition to providing a sinking fund sufficient to maintain all necessary repairs and replacements and to retire the entire equipment investment within four years, and they are doing this in a territory already served by electric railroads.

"With these possibilities, capital will be attracted to the business and stocks of motor bus companies will be popular with investors all over the country. Moreover, motor truck factories will be busy supplying the demand for motor buses . . . for the United States is full of far-seeing men who are quick to grasp an opportunity and who will wish to be among those who are the first to ride into fortune on a motor bus!"

# Big Decrease in Truck Production in 1921 Only a Temporary Setback

*An Analysis of 1921 and a Forecast for 1922*

**P**RODUCTION figures available to date on motor trucks indicate a total of about 200,000 vehicles for 1921.

This is, of course, a big drop from the production figures of 1920, the latter year turning out a total of about 348,000 vehicles. This means that 1921 has shown a falling off in truck production amounting to 42.5 per cent.

But this decrease in the number of trucks placed on the market does not in any way reflect a falling off in the economic use of trucks, although to a certain extent it does reflect a decrease in the number of buyers looking for trucks.

The decrease is due to a considerable extent to the business depression through which the country has been passing during the year just closed. The decrease in the number of truck buyers has also been due to some extent to the number of army trucks thrown on the market during the last year and sold at a price with which manufacturers of new trucks could not possibly compete.

## Wearing Old Suits

The fact of the matter is, the truck user has not ceased or put off buying trucks because of any decrease in the amount of work which trucks do, nor because of the discovery of any better medium for accomplishing that work. They have put off buying trucks for the same reason that many of us are putting

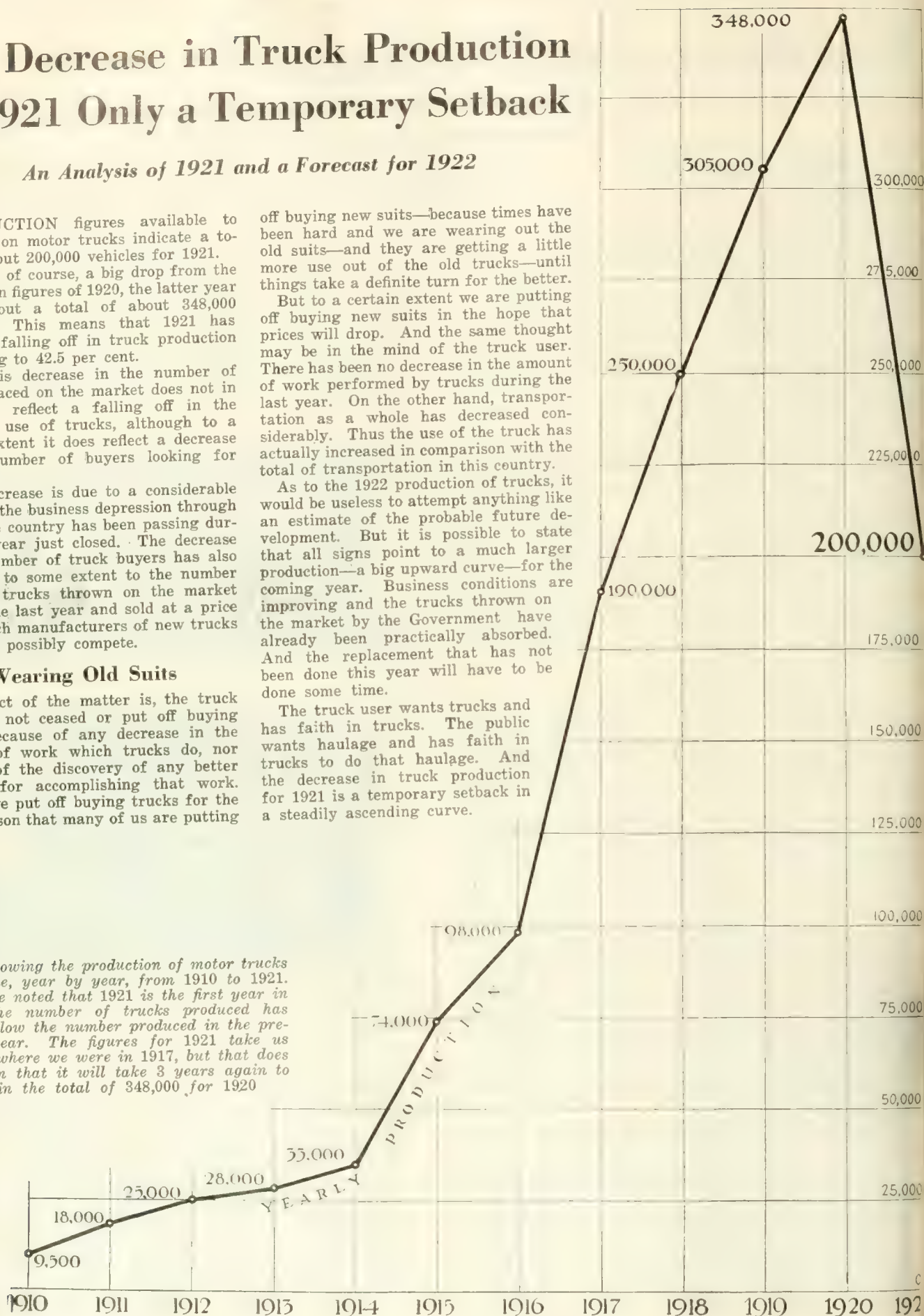
off buying new suits—because times have been hard and we are wearing out the old suits—and they are getting a little more use out of the old trucks—until things take a definite turn for the better.

But to a certain extent we are putting off buying new suits in the hope that prices will drop. And the same thought may be in the mind of the truck user. There has been no decrease in the amount of work performed by trucks during the last year. On the other hand, transportation as a whole has decreased considerably. Thus the use of the truck has actually increased in comparison with the total of transportation in this country.

As to the 1922 production of trucks, it would be useless to attempt anything like an estimate of the probable future development. But it is possible to state that all signs point to a much larger production—a big upward curve—for the coming year. Business conditions are improving and the trucks thrown on the market by the Government have already been practically absorbed. And the replacement that has not been done this year will have to be done some time.

The truck user wants trucks and has faith in trucks. The public wants haulage and has faith in trucks to do that haulage. And the decrease in truck production for 1921 is a temporary setback in a steadily ascending curve.

Curve showing the production of motor trucks in volume, year by year, from 1910 to 1921. It will be noted that 1921 is the first year in which the number of trucks produced has fallen below the number produced in the preceding year. The figures for 1921 take us back to where we were in 1917, but that does not mean that it will take 3 years again to attain the total of 348,000 for 1920





# Truck Prices and Final Drives

*An Analysis of These Two Subjects of Paramount Interest to Fleet Owners Shows a Reduction in Prices and an Increased Preference for Worm Drive*

EVERY truck owner is interested in the trend of prices on trucks, which are an important if not the most important part of his business. But most truck operators and owners are also interested in the trend in design of trucks. And the most important part of a truck in which the design varies widely is the final drive.

What does an analysis of the 1922 specifications show on these two subjects?

In the first place, only trucks nationally distributed can be said to be of nation-wide interest, so that this analysis is limited to such nationally distributed trucks. But an analysis of the prices of these trucks brings to light some very important points, of general interest to fleet owners.

Considered by models, there has been a general reduction trend on prices all along the line, with one or two exceptions. The average price on the  $\frac{1}{2}$ -ton truck was \$1,080 in 1921. With 1922 the average price for trucks of this capacity is only \$983.

In the same way, the average price for the 1-tonner was \$1,988 in 1921, while it is only \$1,775 in 1922. That of the  $1\frac{1}{2}$ -ton truck was \$2,541 in 1921 and is \$2,435 in 1922. That of the 2-ton was \$3,003 in 1921 and is \$2,941 in 1922. That of the  $3\frac{1}{2}$ -ton was \$4,292 in 1921 and is \$4,193 in 1922. While the average

price of the 5-ton truck was \$5,170 in 1921 and is only \$4,844 in 1922 models.

On the other hand, the average prices of the  $\frac{3}{4}$ -ton truck and the  $2\frac{1}{2}$ -ton truck have slightly increased. The  $\frac{3}{4}$ -ton

## TRUCK PRICES

### Average Prices

Size, Tons.	1921	1922
$\frac{1}{2}$ .....	\$1,080	\$983
$\frac{3}{4}$ .....	1,730	1,876
1 .....	1,988	1,775
$1\frac{1}{2}$ .....	2,541	2,435
2 .....	3,003	2,941
$2\frac{1}{2}$ .....	3,241	3,325
$3\frac{1}{2}$ .....	4,292	4,193
5 .....	5,170	4,844

average price was \$1,730 in 1921, but it is \$1,876 in 1922 models. The  $2\frac{1}{2}$ -ton truck average price was \$3,241 in 1921 and has increased to \$3,325 in 1922.

These increases are small, however, and the general tendency on prices is down, a fact that will be received with a good deal of enthusiasm by fleet owners. Trucks are still priced too high and this tendency is a healthy one for all concerned.

Lumping together the averages on all the models as regards price gives an average price for all models of \$2,881 for 1921. The same process for 1922

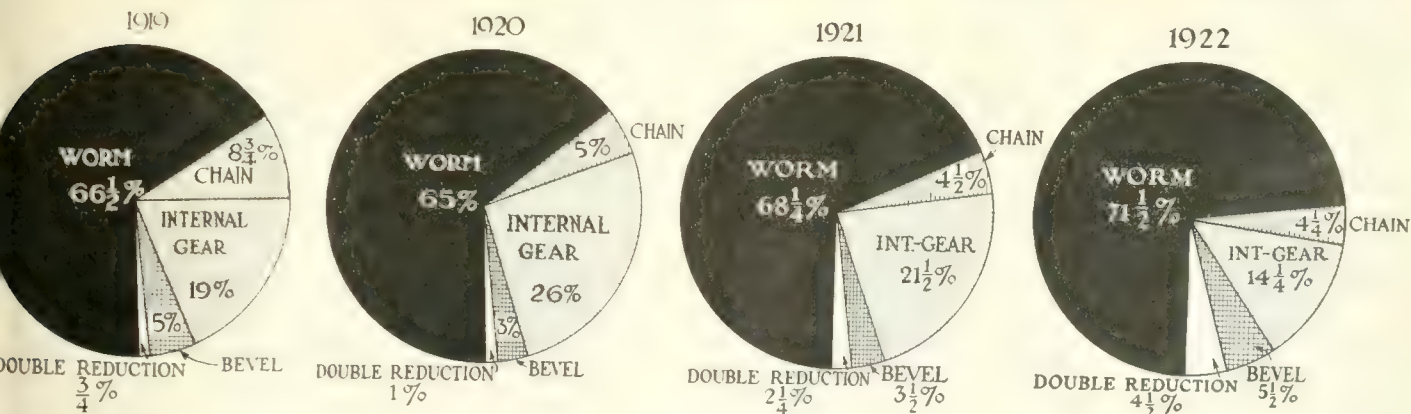
gives an average price of \$2,797 for all models. While this difference shows an average decrease of only 2.9 per cent, the price reductions on certain models have been very much greater, ranging, as they do, from about 5 per cent up as high as 50 per cent. The whole movement is a tendency in the right direction, both for the men who buy and use the trucks and for the men who are building and selling them.

With reference to final drive, the charts below show the trend in final drive according to models on the market, each model having an equal value with each of the others, for the sake of the analysis. The chart shows an increase for the worm, bevel, and double reduction types and a decrease for the internal gear type of drive. The chain drive remains practically stationary.

If models were considered by production, those with the largest production being given the largest value, etc., the decision would be slightly different, as in former years. But like former years, the same trend would be shown, the vast majority of trucks on the market being of the worm drive type.

Moreover, this second method would show the same tendency to a preference for an enclosed form of drive, rather than the chain drive. This statement is based on the incomplete production figures already available.

## Percentage of Final Drive by Models Offered



The final drive averages shown above are calculated on the number of models offered in each particular year and as included in the specifications of those trucks published in THE COMMERCIAL VEHICLE for that year. These averages show a continuation of the steady increase in the use of the worm drive, a slight increase in bevel and double reduction, a slight decrease in chain drive and a larger decrease in the use of the internal-gear drive. A fuller view of this trend in final drive could be had from an analysis of truck production. But production figures are not yet available for 1921. A forecast, however, shows the same trend in production.

# State Laws Governing Motor Truck Regulation

State	Date New Law Effective	Registration Fees Previously in Effect	New Fees	Weight Limits	Dimension Limits	M. P. H. Speed Limits	Gasoline Tax	General Tax
Alabama	No new law	Tons capacity 1 and less.....\$15.00 1 to 2.....22.50 2 to 3.....37.50 3 to 4.....56.25 over 4.....75.00	No change	Old	Old	Old		Registration fee in lieu of all taxes
Arizona	Jan. 1, 1922	Horsepower 25.....\$5.00 26 to 40.....10.00 over 40.....15.00	Tons capacity 1½ and less.....\$10 1½ to 3.....15 over 3.....25	New	New	No change	1 cent per gallon	Personal property
Arkansas	May 1, 1921	Flat rate of \$10	Tons capacity 1 and less.....\$15 1 to 1½.....20 1½ to 2.....25 2 to 2½.....35 2½ to 3.....50 3 to 3½.....60 3½ to 4.....80 4 to 4½.....100 4½ to 5.....125 5 to 6.....150	Maximum capacity, 6 tons	Old	City.....10-15 Country.....30	1 cent per gallon	Personal property
California	No new law affecting fees. Amendment 1921 with respect to weight limits.	40 cents per h.p. plus the following unladen weight Less than 2 tons.....\$5 2 to 3.....10 3 to 5.....15 5 and over.....20	No change	Maximum gr. wt. for 4 wheels, 30,000 lbs.; 6 wheels and 3 axles, 40,000 lbs.; per in. width tire base, 700 lbs.	No change			Personal property
Colorado	Amended 1921	Tons capacity 1.....\$10.00 1 to 2.....17.50 2 to 3.....35.00 3 to 4.....52.50 4 to 5.....70.00 for each ton over 5.....25.00	No change	Maximum gr. wt., 8 tons	Width, 12 ft. in frame; elsewhere 9 ft. elsewhere	General, 35; mountain highways, 20; curves, 18; vehicles of gr. wt. over 3 tons, 15.	1 cent per gallon	Personal property
Connecticut	Jan. 1, 1922	Tons capacity ½ and less.....\$11 ½ to 1.....15 \$5 additional for each ½ ton up to 5 tons. 5 to 5½.....\$87.50 5½ to 6.....100.00 6 to 6½.....112.50 6½ to 7.....125.00 7 to 7½.....150.00 7½ to 8.....200.00 over 8 tons.....200.00 plus \$100 per additional ton	Tons capacity 1 and less.....\$20 up to 3½ tons. 3½ to 4.....\$137.50 4 to 4½.....162.50 4½ to 5.....187.50 5 to 5½.....212.50 5½ to 6.....237.50 Over 6 tons.....250.00 Plus \$100 per additional ton	Gr. wt., 25,000 lbs.	Width, 96 in.; height, 12 ft., 2 in.	No change	1 cent per gallon	Personal property
Delaware	No new law	\$2 per 500 lbs. gr. wt.	No change	Maximum gr. wt., 20,000 lbs.; per inch width of tire, 700 lbs.	Width, 96 in.; height, 12 ft., 2 in.	City.....15 Country.....30		Registration fee in lieu of all taxes.
Florida	Jan. 1, 1922	Tons capacity 1 and less.....\$10 1 to 2.....25 2 to 4.....50 over 4.....100	Pneumatic tire equipped, 75 cents per 100 lbs. gr. wt. Solid tire equipped, \$1.12 per 100 lb. gr. wt.	Country roads, 10,000 lbs. with pneumatic tires, 8,000 lbs. with solid	Width, 84 in.; height, 12 ft.	30 15 on bridges and turns; passing street railway cars, 5. If gr. wt. is 5 tons or more, 10.	1 cent per gallon	Personal property
Georgia	No new law	Tons capacity 1 and less.....\$15 Increase of \$7.50 per ½ ton, up to 3½ tons. 3½ to 4.....\$75 4 to 5.....150 5 to 6.....375 6 to 7.....750 over 7.....1,125	No change	None	Width, 84 in.; height, 12 ft.	No change	1 cent per gallon	Personal property



State	Date New Law Effective	Registration Fees Previously in Effect	New Fees		Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
			Old	New	Old	New	Old	New	Old	New		
Idaho	No new law	Gross weight 1 and less ..... \$15 1 to 1½ ..... 20 1½ to 2 ..... 30 over 2 ..... 40	No change	No change	No vehicle to be loaded to exceed 50% over the manufacturer's rated capacity	No change	Width, 66 in.	No change	30	No change		Registration fee in lieu of all taxes.
		Tons capacity ¼ to ¾ ..... \$6 ¾ to 1 ..... 8 1 to 2 ..... 10 2 to 3½ ..... 20 3½ to 5 ..... 30 5 to 7½ ..... 40 7½ and over ..... 50	Tons capacity less than 1 ..... 1 to 2 ..... 2 to 3½ ..... 3½ to 5 ..... 5 to 7½ ..... 7½ and over ..... No change	7½ ton capacity	10 ton capacity				City ..... Country ..... 25	No change		Personal property
Indiana	Jan. 1, 1922	Tons capacity 1 and less ..... \$15 1½ ..... 22 50 2 ..... 30 2½ ..... 45 3 ..... 65 3½ ..... 90 4 ..... 105 4½ ..... 120 5 ..... 135 6 ..... 165 Per ton over 6 ..... 50.00	No change	Per in. width of pneumatic tire, 800 lbs.; solid, 500 lbs.					Gr. wt. tons pneumatic, less than 3, 30; 3 to 6, 25; 6, 16; Solid, less than 3, 25; 3 to 6, 20; 6, 12; metal, 10.			Registration fee in lieu of all taxes.
		Tons capacity 1 and less ..... \$15 1½ ..... 22 50 2 ..... 30 2½ ..... 45 3 ..... 65 3½ ..... 90 4 ..... 105 4½ ..... 120 5 ..... 135 6 ..... 165 Per ton over 6 ..... 50.00	No change	Per in. width of pneumatic tire, 800 lbs.; solid, 500 lbs.					Gr. wt. tons pneumatic, less than 3, 30; 3 to 6, 25; 6, 16; Solid, less than 3, 25; 3 to 6, 20; 6, 12; metal, 10.			Registration fee in lieu of all taxes.
Kansas	July 1, 1921	Flat rate, \$5	Tons capacity 1 and less ..... \$15 1 to 1½ ..... 22 50 each ½ ton up to 3 tons capacity ..... \$70.00 3 to 4 ..... 100.00 4 to 5 ..... 100.00 5 ..... 100.00 plus \$25 per ton or fraction thereof.	No change	Per in. width of tire rubber ..... 800 lb. metal ..... 500 lb.				Capacity tons City ..... 1 to 2½ ..... 10-15 2½ to 3 ..... 7-14 3 to 4 ..... 7-11 Metal ..... 6-8 Country ..... 1 to 2½ ..... 25 2½ to 3 ..... 20 3 to 4 ..... 15 4 to 5 ..... 10 Metal ..... 10			Personal property
		Tons capacity 1½ and less ..... \$22 1½ to 1 ..... 30 and \$10 per additional ½-ton up to 3 ..... 90 3 to 3½ ..... 110 3½ to 4 ..... 130 4 to 4½ ..... 150 4½ to 5 ..... 150 over 5 ..... 150 plus \$50 for each additional ton.	No change	Per in. width of tire, 800 lbs.; per axle, 16,000 lbs.; within cities of 20,000, increase 50%.					Gr. Wt. Pneumatic ..... 25 2½ to 6 ..... 20 6 to 7½ ..... 15 Over 7½ ..... 12 Solid ..... 2½ ..... 20 2½ to 6 ..... 15 6 to 7½ ..... 12			Personal property
Kentucky	No new law	Tons capacity 1½ and less ..... \$22 1½ to 1 ..... 30 and \$10 per additional ½-ton up to 3 ..... 90 3 to 3½ ..... 110 3½ to 4 ..... 130 4 to 4½ ..... 150 4½ to 5 ..... 150 over 5 ..... 150 plus \$50 for each additional ton.	No change	Per in. width of tire, 800 lbs.; per axle, 16,000 lbs.; within cities of 20,000, increase 50%.					Gr. Wt. Pneumatic ..... 25 2½ to 6 ..... 20 6 to 7½ ..... 15 Over 7½ ..... 12 Solid ..... 2½ ..... 20 2½ to 6 ..... 15 6 to 7½ ..... 12			Personal property
		Gross Weight 2½ tons and less ..... \$12.00 2½ to 6 ..... 22.50 6 to 7½ ..... 35.00 over 7½ ..... 60.00	No change	Per in. width of tire, 800 lbs.; per axle, 16,000 lbs.; within cities of 20,000, increase 50%.					Gr. Wt. Pneumatic ..... 25 2½ to 6 ..... 20 6 to 7½ ..... 15 Over 7½ ..... 12 Solid ..... 2½ ..... 20 2½ to 6 ..... 15 6 to 7½ ..... 12			Personal property
Illinois	No new law	Gross Weight 2½ tons and less ..... \$12.00 2½ to 6 ..... 22.50 6 to 7½ ..... 35.00 over 7½ ..... 60.00	No change	Per in. width of tire, 800 lbs.; per axle, 16,000 lbs.; within cities of 20,000, increase 50%.					Gr. Wt. Pneumatic ..... 25 2½ to 6 ..... 20 6 to 7½ ..... 15 Over 7½ ..... 12 Solid ..... 2½ ..... 20 2½ to 6 ..... 15 6 to 7½ ..... 12			Personal property
		Gross Weight 2½ tons and less ..... \$12.00 2½ to 6 ..... 22.50 6 to 7½ ..... 35.00 over 7½ ..... 60.00	No change	Per in. width of tire, 800 lbs.; per axle, 16,000 lbs.; within cities of 20,000, increase 50%.					Gr. Wt. Pneumatic ..... 25 2½ to 6 ..... 20 6 to 7½ ..... 15 Over 7½ ..... 12 Solid ..... 2½ ..... 20 2½ to 6 ..... 15 6 to 7½ ..... 12			Personal property
Louisiana	New law pending.	Flat rate, 7.50	No change	Per in. width of tire, 800 lbs.; per axle, 16,000 lbs.; within cities of 20,000, increase 50%.					Gr. Wt. Pneumatic ..... 25 2½ to 6 ..... 20 6 to 7½ ..... 15 Over 7½ ..... 12 Solid ..... 2½ ..... 20 2½ to 6 ..... 15 6 to 7½ ..... 12			Personal property
		Flat rate, 7.50	No change	Per in. width of tire, 800 lbs.; per axle, 16,000 lbs.; within cities of 20,000, increase 50%.					Gr. Wt. Pneumatic ..... 25 2½ to 6 ..... 20 6 to 7½ ..... 15 Over 7½ ..... 12 Solid ..... 2½ ..... 20 2½ to 6 ..... 15 6 to 7½ ..... 12			Personal property
Maine	July 9, 1921	Tons capacity 1 and less ..... \$10 and \$10 additional for each ton up to 5. For each ton between 5 and 10, \$15 additional.	Tons capacity 1½ and less ..... \$10 1½ to 1 ..... 15 1 to 2 ..... 20 2 to 3 ..... 55 3 to 4 ..... 80 over 4, vehicles equipped with 2 or more solid tires pay 33½% additional.	18,000 lbs. Per in. width of tire, 800 lbs.	18,000 lbs. gr. wt. on 4 wheels, 13½ tons on 6 wheels; per in. width of tire, 700 lbs.	Width, 96 in. height, 12½ ft.	Gr. wt. tons 4 to 6 ..... 15 Over 6 ..... 6					Personal property
		Tons capacity 1½ and less ..... \$10 1½ to 1 ..... 15 1 to 2 ..... 20 2 to 3 ..... 55 3 to 4 ..... 80 over 4, vehicles equipped with 2 or more solid tires pay 33½% additional.	18,000 lbs. Per in. width of tire, 800 lbs.	18,000 lbs. gr. wt. on 4 wheels, 13½ tons on 6 wheels; per in. width of tire, 700 lbs.	Width, 96 in. height, 12½ ft.	Gr. wt. tons 4 to 6 ..... 15 Over 6 ..... 6						Personal property

This table is based on statistics gathered by the National Automobile Chamber of Commerce. In the column "Date new law is effective," where the caption "No New Law" appears, it is meant to indicate that there has been no change in the law since Jan. 1, 1921

## State Laws Governing Motor Truck Regulation—Continued

State	Date New Law Effective	Registration Fees Previously in Effect	New Fees	Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
				Old	New	Old	New	Old	New		
Maryland	No new law	Pneumatic tires Per h. p. . . . . 80¢ (Minimum, \$10) Solid tires Tons capacity \$20 per ton up to 3 3 to 4 . . . . . \$100 4 to 5 . . . . . 150 5 to 6 . . . . . 300 6 to 7 . . . . . 500 Electric—solid—half above rates	No change	Maximum gr. wt., 10 tons. Per in. width of tire, 650 lbs.	No change	Width, 90 in.	No change	Old Solid Tons 2 and less . . . . . 25 2 to 6 . . . . . 15 Over 6 . . . . . 12 Metal tires Pneumatic City . . . . . 15-20 Country . . . . . 35 Over 3 Tons . . . . . 25	No change		Personal property
Massachusetts	No new law	Tons capacity 1 and less . . . . . \$10 1 to 2 . . . . . 20 and \$10 additional for each ton. Electric trucks, half above rates.	No change	Maximum gr. wt., 14 tons; per in. width of tire, 800 lbs.	No change	Width, 96 in.; length, 28 ft. Trailer combination, 66 ft.	No change	City . . . . . 15 Country . . . . . 20 Over 4 ton gr. wt 15 Metal tires . . . . . 4	No change		Personal property
Michigan	No new law	Per h. p. . . . . 25¢ Per 100 lbs unladen wt 35¢ Electric Per h. p. . . . . \$1 Per 100 lbs wt. . . . . 35¢	No change	Size of tire in 2 . . . . . 700 2½ . . . . . 900 3 . . . . . 1200 3½ . . . . . 1600 4 . . . . . 1900 5 . . . . . 2200 6 . . . . . 2700 7 . . . . . 3200 Max. gr. wt., 15 tons	No change	Width, 96 in height, 12½ ft. Trailer combination, 60 ft.	No change	20 to 10, varying with load.	No change		Personal property
Minnesota	April 25, 1921	Flat rate, \$5	2% value of vehicle Minimum fees. Tons capacity Less than 2 . . . . . \$15 2 to 4 . . . . . 30 Over 4 . . . . . 50 Used solely for road and agricultural work not subject to fees.	Per in. width of tire, 800 lbs. Maximum gr wt. 14 tons. Maximum wt. per axle, 22,400 lbs.		Width, 96 in.; height, 12½ ft. Trailer combination, 85 ft.		City . . . . . 15 Country . . . . . 30			Personal property
Mississippi	No new law	Tons capacity Under 1 . . . . . \$10 1 to 1½ . . . . . 15 2 . . . . . 30 2½ . . . . . 35 3 . . . . . 55 3½ . . . . . 75 4 . . . . . 115 4½ . . . . . 155 5 . . . . . 200 6 . . . . . 250 Over 6 . . . . . 300	No change					25	No change		Personal property
Missouri	No new law	Horsepower 2 and less . . . . . \$2 2 to 11 . . . . . 4 12 to 23 . . . . . 6 24 to 35 . . . . . 10 36 to 47 . . . . . 14 48 to 59 . . . . . 16 60 to 71 . . . . . 20 72 and over . . . . . 24	No change								Personal property
Montana		Tons capacity 1 and less . . . . . \$5 1 to 2 . . . . . 15 2 to 3 . . . . . 25 Over 3 . . . . . 40	Tons capacity 1 and less . . . . . \$10.00 1 to 2 . . . . . 22.50 2 to 3 . . . . . 37.50 Over 3 . . . . . 60.00					City . . . . . 15 Country . . . . . 25	No change	1 cent per gallon	Personal property



State	Date New Law Effective	Registration Fees Previously in Effect	New Fees	Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
				Old	New	Old	New	Old	New		
Nebraska	No new law	1 ton gr. wt. .... \$10 for each 100 lbs. additional gr. wt. .... 50¢	No change	Per in. width of tire, 600 lbs. on one wheel, 9,000 lbs.	No change	Width, 7½ ft.; height, 12 ft.	No change	35	No change		Personal property
Nevada	No new law	Per 100 lbs. gr. wt. 25¢	No change	Gr. wt. 10 tons, per in. width of tire, 400 lbs.; Solid tires, 500 lbs.	No change			Reasonable, varying with weight and kind of tire. Maximum ..... 25	No change		Personal property
New Hampshire	Jan. 1, 1921	Horsepower 15 and less ..... \$10 15 to 30 ..... 15 30 to 40 ..... 20 40 to 50 ..... 25 50 to 60 ..... 30 60 ..... 40	Per 100 lbs. gr. wt. \$ 60 Pneumatic tires, (Minimum, \$20) .85 Solid (Minimum, \$30) 1.00 Metal 1.00				Width, 96 in.; length, 30 ft. Trailer combination, 85 ft.				None
New Jersey	Jan. 1, 1922	Tons gr. wt. ½ and less ..... \$6 ½ to 1 ..... 9 1 to 1½ ..... 12 1½ to 2 ..... 15 2 to 2½ ..... 18 2½ to 3 ..... 24 and an increase of \$2 for each additional half ton.	Tons gr. wt. ½ and less ..... \$10 ½ to 1 ..... 12 1 to 1½ ..... 15 1½ to 2 ..... 20 2 to 2½ ..... 24 2½ to 3 ..... 28 and an increase of \$3 for each additional half ton up to 4 tons. 4 to 4½ ..... 36 4½ to 5 ..... 38 and an increase of \$2 for each additional half ton. Ownership of corporation outside state, \$100 additional.	Per in. width of tire, 800 lbs.; gr. wt., 30,000 lbs.	Per in. width of tire, 800 lbs.; basis max. width of rubber, 5,000 lbs. gr. wt. unless permit for 30,000 is obtained.	Width, 92 in.; length, 26½ ft.; height, 12½ ft.	Width, 96 in.; length, 28 ft.; height, 12½ ft.	Gr. wt. tons: 4 to 6 ..... 16 6 to 8 ..... 14 8 to 15 ..... 10	No change		Personal property
New Mexico	Jan. 1, 1922	Per h. p. 50¢	\$12 lbs 40¢ per 100 lbs. of rated load capacity over 11½ tons. Solid tires, 25¢ higher than above.	Per in. width of tire, 800 lbs. Maximum gr. wt., 25,000 lbs.	No change		Width, 96 in.	Option of local authorities	City ..... 15 Country ..... 30 Railroad crossings 6	1 cent per gallon	Personal property
New York	No new law	Ton gr. wt. 2 and less ..... \$10 and an increase of \$5 for each additional ton up to 14. Over 14 ..... \$70 Plus \$10 for each additional ton.	No change	Per in. width of tire, 800 lbs. Maximum gr. wt., 25,000 lbs.	Width to be taken: Base channel "r" between flanges and rim.	Width, 9 ft.; height, 12½ ft.	Racks may be 8 ft. at bottom, 12 ft. at top.	Maximum ..... 30	No change		None
North Carolina	July 1, 1921	Tons capacity 1 ..... \$12 50 1 to 2 ..... 25 00 2 to 3 ..... 40 00 3 to 4 ..... 65 00 4 to 5½ ..... 100 00 5½ and over ..... 200 00	Tons capacity less than ½ ..... \$12 50 ½ to 1 ..... 15 00 1 to 2 ..... 25 00 2 to 3 ..... 40 00 3 to 4 ..... 65 00 4 to 5½ ..... 100 00 5½ and over ..... 200 00							1 cent per gallon	Personal property
North Dakota	No new law	Per dollar list price .. \$ .005 Per 100 lbs. wt. .... 20 Per h. p. .... 10 For second year, 10% reduction; third, 25%, and thereafter, 40%. In addition ton capacity is assessed as follows: Less than 3 ..... \$3 3 to 4 ..... 5 Over 4 ..... 10	No change					City ..... 10 Country ..... 30	No change		Registration fee in lieu of all taxes.
Ohio	No new law	Horsepower 25 and less ..... \$8 26 to 35 ..... 12 Over 35 ..... 20 Electrics ..... 8 20¢ per 100 lbs. gr. wt. is added to above.	No change	Max. gr. wt. 10 tons; per in. width of tire: steel (3 in.), 500 lbs.; rubber, 600 lbs.; per axle 14,000 lbs. One wheel not to exceed 35% gr. wt.	No change	Width, 96 in.; height, 12½ ft.; length, 30 ft. Trailer combination, 85 ft.	No change	Tons gr. wt. Pneumatic Less than 5 ..... 25 5 to 8 ..... 20 8 to 10 ..... 15 Solid Less than 5 ..... 20 5 to 8 ..... 15 8 to 10 ..... 12			Personal property

## State Laws Governing Motor Truck Regulation—Continued

State	Date New Law Effective	Registration Fees Previously in Effect	New Fees	Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
				Old	New	Old	New	Old	New		
Oklahoma	No new law	Tons capacity 3 and less ..... \$15 3 1/2 to 4 ..... 20 4 to 5 ..... 25 5 to 6 ..... 30 6 to 7 ..... 35 7 to 8 ..... 40 8 to 9 ..... 45 9 to 10 ..... 50 10 and over ..... 60 Reduction of 20% each year for 3 years, except those of 3 ton or more capacity (Minimum, \$10).	No change								Registration fee in lieu of all taxes.
Oregon	Jan. 1, 1922	Tons capacity 1 to 1 1/2 ..... \$22 1 1/2 to 2 ..... 48 2 to 3 ..... 55 3 to 4 ..... 65 4 and over ..... 100 Reduction of 20% each year for 3 years, except those of 3 ton or more capacity (Minimum, \$10).	Total tire width (1 or more solid tires) 14 in. and less ..... \$35 15 to 17 ..... 42 18 to 22 ..... 55 23 to 26 ..... 65 27 to 30 ..... 105 31 to 36 ..... 126 37 to 40 ..... 140 (4 pneumatic tires) 20 in. and less ..... 35 21 to 24 ..... 42 25 to 28 ..... 49 29 to 32 ..... 56 33 to 40 ..... 70	Gr. wt., 22,000 lbs.; per axle, 17,600 lbs.; per in. width of tire, 500 lbs.; for 30 in. tire width of all wheels, 600 lbs.; more than 30 in. Max. for metal tires, 6,500 lbs., on hard surface roads.	Width, 96 in.		30, 25, 22, 20 and 18 for pneumatic tires and gr. wt. ranging from 6,000 to 22,000 lbs. 25, 20, 18, 15 and 12 m. p. h. for solid tires. Metal tires, 8.		2 cents per gallon	None	
Pennsylvania	Jan. 1, 1922	Lb. Chassis Wt. 3,000 to 3,000 ..... \$20 3,000 to 4,500 ..... 25 4,500 to 6,000 ..... 30 6,000 to 7,000 ..... 50 7,000 to 8,000 ..... 75 8,000 to 10,000 ..... 100 10,000 and over ..... 130	Classes Wt. 1 to 1 1/2 Tons ..... \$24 1 1/2 to 2 ..... 32 2 to 2 1/2 ..... 40 2 1/2 to 3 ..... 50 3 to 3 1/2 ..... 56 3 1/2 to 4 ..... 70 4 to 4 1/2 ..... 80 4 1/2 and over ..... 100 Electric with solid or pneumatic tires in pneumatic tire class.	Per in. width of tire 800 lbs. gr. wt., 25,000 lbs., wt. 1 axle, 15,500 lbs.	Width, 96 in.; length, 28 ft.	26 to 10, varying with wt. of chassis and whether pneumatic or solid tires.	No change	1 cent per gallon	None	Personal property	
Rhode Island	Jan. 1, 1922	Tons capacity 1 and less ..... \$7 Over 1 ..... 7 Plus \$3 per ton up to 4. 4 ..... 16 Plus \$4 per ton up to 9. Over 9 ..... 40	25¢ per h. p., plus following for each 100 lbs. gr. wt. Pneumatic ..... 35¢ Solid ..... 50¢							Personal property	
South Carolina	No new law	Tons capacity 1 and less ..... \$15 1 to 2 ..... 30 2 to 3 ..... 60 3 to 4 ..... 100 4 to 5 ..... 200 5 to 6 ..... 250 6 and over ..... 350 25% reduction for pneumatic tires.	No change	4 tons capacity unless by special permit.	Width, 7 1/2 ft.	No change				Personal property	
South Dakota	Jan. 1, 1922	Tons capacity 2 and less ..... \$6 2 to 3 1/2 ..... 10 3 1/2 to 5 ..... 15	Tons capacity less than 1 ..... \$15 1 to 1 1/2 ..... 20 1 1/2 to 2 ..... 25 2 to 3 ..... 35 3 and over ..... 75						1 cent per gallon	Personal property	
Tennessee	No new law	50¢ per h. p., plus \$5 per ton capacity; electric, \$25 plus \$5 per ton capacity.	No change	3 ton capacity in communities having population between 21,491 and 21,485.						None	



State	Date New Law Effective	Registration Fees Previously in Effect	New Fees	Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
				Old	New	Old	New	Old	New		
Texas	Jan. 1 1922	Tons capacity 1 to 2 ..... \$16 2 to 3 ..... 32 3 to 4 ..... 48 4 to 5 ..... 80	Tons capacity 1 to 2 ..... \$30 2 to 3 ..... 50 3 to 4 ..... 80 4 to 5 ..... 120	Per in. width of tire, 5,000 lbs.	No change	Width, 7 ft.	No change	25	Gr. wt. tons Pneumatic 2 ..... 15 3 ..... 12 4 and over ..... 10 Solid 2 ..... 14 Over 2 ..... 10		Personal property
				Gr. wt., 10 tons	Gr. wt., 11 tons; per wheel, 3½ tons; per in. width of tire, pneumatic, 400 lbs. dirt or gravel 400 lbs.	Width, 96 in.	Width, 96 in.	Reasonable and safe	Gr. wt. tons Pneumatic Less than 3 ..... 30 3 to 4 ..... 25 Over 4 ..... 16 2 or more solid Less than 3 ..... 20 3 to 4 ..... 15 Over 4 ..... 8 Metal ..... 5 m.p.h.		Personal property
Utah	April 1, 1921	Flat rate of \$10.	Tons All Cap. Pneum. 2 or more Solid Metal 1 ..... \$20 1½ ..... 25 2 ..... 30 2½ ..... 35 3 ..... 45 3½ ..... 55 4 ..... 65 4½ ..... 75 5 ..... 90 On special permit truck over 5 ton is charged \$50 extra per ton.	Maximum gr. wt., 24,000, per in. width of tire, 700 lbs.	No change			City ..... 10 Country ..... 20	No change		Personal property
Virginia	No new law	Tons capacity 1 ..... \$15 each additional ½ ton ..... 5	No change	Per in. width of tire, 600 lbs.; maximum gr. wt., 6½ tons	No change	Width, 8 ft.; height, 12 ft 2 in	No change	4 tons ..... 15 6 tons ..... 12			Registration fee in lieu of all taxes.
Vermont	No new law	Tons capacity 1 to 1 ..... \$20 1 to 1½ ..... 30 1½ to 2 ..... 40 2 to 2½ ..... 50 2½ to 3 ..... 75 3 to 4 ..... 100 each ton over 4, \$25 additional.	No change	10,000 lb. load.	No change			Tons capacity 2 to 3 ..... 15 3 to 4 ..... 13 4 to 5 ..... 12 Over 5 ..... 10	Pneumatic ..... 25 Tons capacity Solid 2 to 4 ..... 20 4 to 8 ..... 18 8 to 10 ..... 16 10 to 12 ..... 12	1 cent per gallon	Personal property
Washington	Jan. 1, 1922	Weight up to 5,500 lbs., \$10, plus 40¢ per 100 lbs. over 1,500 lbs., plus 40¢ per 100 lbs. of rated capacity. Over 5,500 lbs., \$10, plus 50¢ per 100 lbs. over 1,500 lbs., plus 50¢ per 100 lbs. rated capacity.	No change	Per in. width of tire, 600 lbs.; gr. wt., 30,000 lbs.	Gr. wt., 24,000 lbs.; per axle, 22,400 lbs.; per in. width of tire, 800 lbs.	Width, 90 in.	No change				Personal property
West Virginia	Jan. 1, 1922	Pneumatic tires, 30¢ per h.p., plus 30¢ per 100 lbs gr. wt. Solid tires Tons capacity 1 ..... \$15 2 ..... 25 3 ..... 40 4 ..... 55 5 ..... 85 7 ..... 125 Over 7 ..... 200	Pneumatic tires, no change. Solid Tons capacity 1 ..... \$25 2 ..... 50 3 ..... 100 4 ..... 200 5 ..... 400	Per in. width of tire, 600 lbs.; gr. wt., 30,000 lbs.	Per in. width of tire, 600 lbs.; gr. wt., 22,000 lbs.; per axle, 17,000 lbs.; per wheel, 9,000 lbs.	Width, 90 in.	No change				Personal property
Wisconsin	No new law	1½ capacity Under 2,100 ..... \$15 2,100 to 5,000 ..... 20 5,100 or more ..... 25	No change	Per in. width of tire, 800 lbs.; gr. wt., 24,000 lbs.; per axle, 18,000 lbs.	No change	Width, 96 in.; length, 30 ft.					Personal property
Wyoming	Jan. 1, 1922	75¢ per 100 lbs. of vehicle fully equipped	Tons capacity 1 and less ..... \$15 1 to 2 ..... 30 2 to 3 ..... 50 3 to 4 ..... 75 4 to 5 ..... 100 Over 5 ..... 150	Gr. wt., 25,000 lbs.	No change						Personal property

# Trailer Fees: Old and New

*Old and New Laws in the Different States*

State	Date new law effective	Old Fees	New Fees	State	Date new law effective	Old Fees	New Fees
Alabama	No trailer law			Missouri	No trailer law		
Arizona	No trailer law			Montana	No trailer law		
Arkansas	May 1, 1921		Ton Capacity Pneu. tires 1 or less.....\$10 1 to 2..... 15 2 to 3..... 25 3 to 4..... 40 4 to 5..... 50 No schedule fixed for solid tires.	Nebraska	No trailer law		
California	No new law	Per trailer.....\$2.00	No change	Nevada	No new law	Same as trucks	No change
Colorado	No new law	1 to 2-ton capacity.\$10 For each additional ton ..... 5	No change	New Hampshire	Jan. 1, 1922	No fees previously charged	Per 100 Pneu. sol. Met lb. gr. tires wt. trailer & load \$0.60 \$0.85 \$1.00
Connecticut	No trailer law			New Jersey	Jan. 1, 1922	Same as old truck fees	Same as new truck fees
Delaware	No new law	Per 500 lb. gr. wt., \$2.00 Metal tires, double fees if gr. wt. exceeds 1,500 lbs.	No change	New Mexico	Jan. 1, 1922	No fees previously charged	Rubber Metal Per 100 lb. tires rated cap. \$0.25 \$0.50
Florida	Jan. 1, 1922	Same as trucks if over 500 lbs. capacity. Under 500 lbs. capacity, no fees.	Pneu. Solid Per 100 lb. tires gr. wt....\$0.75 \$1.12	New York	No new law	Gr. wt. Fee Tons 2 or less \$5.00 2 to 5 10.00 5 to 7 15.00 7 to 10 20.00 10 to 14 30.00 Plus \$5 for each ton over 14.	No change
Georgia	No trailer law			North Carolina	July 1, 1921	Ton Capacity 1 \$10 Plus \$20 for each additional ton.	Per Ton Capacity \$15
Idaho	No new law	Same as trucks	No change	North Dakota	No trailer law		
Illinois	No trailer law			Ohio	No new law	Per 100 lb. gr. wt., \$0.20	No change
Indiana	Jan. 1, 1922	Ton cap. of truck drawing trailer Fee Ton cap. of truck drawing trailer Fee 1 to 1 \$3 1 to 1 4 5 to 7 \$20 1 to 2 5 7 1/2 & over 25 2 to 3 10 3 to 5 15	Ton capacity Fee Less than 1..... \$3 1 to 2..... 6 2 to 5..... 10 5 to 7 1/2..... 20	Oklahoma	No trailer law		
Iowa	Jan. 1, 1922	Cap. Fee Iron 2 or more Pneu. or tires steel solid 1 to 1 \$10 \$15 \$10 1 to 2 15 30 15 2 to 3 25 .. 35 3 to 4 40 .. 50 4 to 5 50 .. 60 5 to 6 60 .. 70	Ton Capacity Pneu. 2 or tires more sol.tires 1 to 1 \$10 1 to 2 15 \$5 2 to 3 .. 15 3 to 4 25 35 4 to 5 40 50 5 to 6 50 60 6 to 7 60 70 No change for metal tires. Trailers with capacity of less than 1/2 ton not subject to fee.	Oregon	Jan. 1, 1922	1/2 old truck rates	1/2 new truck rates
Kansas	No trailer law			Pennsylvania	Jan. 1, 1922	Same as old truck fees	Same as new truck fees. With metal tires, double regular fees. No fee required for trailers weighing less than 500 lbs.
Kentucky	No trailer law			Rhode Island	Jan. 1, 1922	No fees previously charged	Pneu Solid Metal Per 100 lb. tires gr. wt. \$0.15 \$0.25 \$0.35
Louisiana	No trailer law			South Carolina	No new law	Per trailer, \$5 plus \$2 per 1,000 lb. carrying capacity	No change
Maine	Jan. 1, 1921	No fees previously charged	Pneu. Solid Iron Per 100 lb. gr. wt. \$0.15 \$0.40 \$0.75	South Dakota	Jan. 1, 1922	No fees previously charged	Same as trucks
Maryland	No new law	1-ton capacity \$10 plus \$20 for each additional ton. Metal tires, double above.	No change	Tennessee	No trailer law		
Massachusetts	No new law	Pneu. tires, 1/2 truck rates. Solid tires, same as trucks. Metal tires, double trucks.	No change	Texas	Jan. 1, 1922	No fees previously charged	Pneu Solid Metal Per 100 tires gr. wt. \$0.15 \$0.25 \$0.35
Michigan	No new law	Per 100 lbs. of trailer's weight \$0.50	No change	Utah	April 1 1921	No fees previously charged	Ton Pneu.Solid Metal Cap. tires .. \$15 1 \$10 \$15 25 2 15 25 50 3 25 40 .. 4 40 60 .. 5 50 75 ..
Minnesota	April 5, 1921	No fees previously charged	2% of value. Minimum fee for 1 ton or less, \$10, plus \$2 per ton or fraction thereof over 1 ton.	Virginia	No new law	1 Ton Capacity, \$15, plus \$3 per each additional 1,000 lbs.	No change
Mississippi	No trailer law			Vermont	No trailer law		
				Washington	No new law	Same as trucks	No change
				West Virginia	No new law	Ton Cap. Solid Pneu. 1 or less \$10 \$5 Each additional ton 15 7.50	No change
				Wisconsin	No trailer law		
				Wyoming	Jan. 1, 1922	No fees previously charged	Same as trucks. No fee required for trailers of less than 500 lbs. capacity



# The Trend in Truck Parts

## Are You Familiar with These New Units?

### Changes and New Designs of Truck Units Placed on the Market During 1921 and to Be Offered for the First Time in 1922

IN the following pages are given brief descriptions of some of the newer designs in truck units placed on the 1921 market and to be offered for the first time in 1922, by the parts manufacturers. The units covered include the following: Engines, Axles, Wheels, Clutches, Gearsets and Universal Joints.

A survey of the field of new designs in these units shows a steady movement toward specialization of design to meet the requirements of speed trucks and motor buses, to insure longer life of the units and to give greater accessibility.

The trend in each unit is briefly described at the beginning of the section devoted to that unit. The first unit described is the engine.

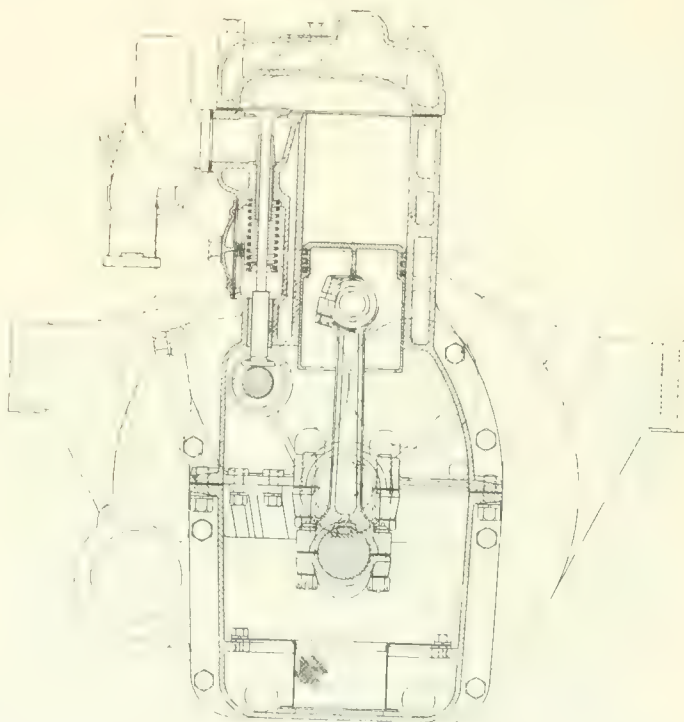
**D**EVELOPMENT in the motor truck engine field has kept pace with the movement for easier servicing of truck units. Truck engines this year are in most cases easier to repair than heretofore. One large engine maker has brought out a model with removable cylinder barrels; another has facilitated easy removal of the valves; while a number of makers have included removable cylinder heads. Much progress has been made toward the elimination of engine vibration through the use of larger diameter crankshafts and deeper crankcases. One maker is using a counterbalanced crankshaft, while another has provided adjustments for endplay in the camshaft and crankshaft.

The speed truck and motor bus have received particular attention from the engine makers, which is manifested in the announcement of a number of new models.

#### Cylinder Barrels Removable

**T**HE Wisconsin Motor Mfg. Co. announces two new models of truck engines: the SU, which is a four-cylinder 3½ by 5 in., intended for 1 and 1½-ton trucks, and the Model NU, a four-cylinder 4¼ by 5 in., intended for 2 and 2½-ton trucks. In the latter engine, the established practice of the Wisconsin company has been followed closely. The Model SU, however, differs from this practice in many important particulars. This engine is of the valve-in-head type, the cylinder heads naturally being removable. Another feature that is as yet rarely met with in truck practice is that the cylinder barrels are removable, thus giving a feature borrowed from tractor engine practice. Three-point suspension is employed and the crankcase and cylinders—with the exception of the removable cylinder barrels—have one integral casting of iron. The entire valve mechanism is enclosed, and for easy

*The Hercules speed truck engine. This engine is a four-cylinder, 4 by 5 in., and weighs slightly less than 600 lb. The engine has a three-bearing crankshaft with force-feed lubrication to the main bearings. The caps of the main bearings are babbitted and poured out without the use of a supporting shell for the babbitt*



mounting and dismantling the valve tappets are assembled in removable plates on the right hand side. The crankshaft is a chrome nickel steel forging and is supported in three strong bronze-back, babbitt-lined bearings of the following dimensions (front to rear): 1 15/16 by 2½ in.; 2 by 2½ in.; 2 1/16 by 3 in. It will thus be seen that the bearing sizes are tapering from one end to the other, a feature which facilitates the manufacturing of the engine. The connecting rod bearings are 2 by 2 in.; the diameter of the wrist pin is 1 1/16 in. and the diameter of the valves 1 11/16 in.

#### Removable Cylinder Head

The NU model is of the block type with

L-head cylinders and aluminum crankcase. The cylinder head is removable. Crankshaft and bearings are of the same type as in the SU model. The main bearings of this engine have the following dimensions (front to rear): 2½ by 2½ in.; 2 3/16 by 2½ in.; and 2¼ by 3½ in. The connecting rod bearings are 2½ by 2¼ in. and the wristpin is 1 3/16 in. in diameter. The valves have a diameter of 1 31/32 in.

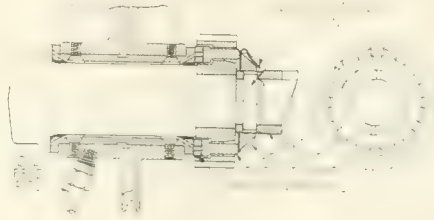
**T**HE Herschell-Spillman Motor Co. manufactures one size of engine suitable for motor truck purposes, a four-cylinder 3½ by 5, which is recommended for trucks up to 1½-ton capacity and especially for speed wagons. The following changes in the design of

this engine were made during the course of the year: The cylinder head studs and nuts have been increased from 7/16 to 1/2 in. A slot is now provided in the end of the fan bracket so that the fan can be easily removed when desired. The valve adjusting nuts are provided with oval heads to insure proper contact with the valve stems and allow positive adjustment. Fibre thrust washers take care of any play in the fan driveshaft. The connecting rod bearings are riveted in place to prevent movement of the bearing which is detrimental to the operation of the engine. All main bearings are now secured in place by screws so that there cannot be any movement of the bearings tending to cause wear and noise. Endplay of the camshaft is adjusted by means of a hardened disk inserted in the hub of the camshaft gear, against which operates a hardened adjusting screw. The crankshaft is recessed at the rear end to take care of inaccuracies in the splined shaft of the transmission.

### Endplay Adjustment

Piston fits are held to within tolerances of 0.0025 and 0.003 in. The piston pins are secured in position by a lock screw provided with a lock nut and cotter pin. The distributor lock screw boss has been strengthened. An endplay adjusting mechanism has been provided on the crankshaft, and permits of taking up the endplay by simply removing the oil cam. In order to insure greater accuracy, the transmission circle of the

bell housing is now drilled after the bell housing has been secured to the engine. The inside of the engine is given a coat of a special paint to prevent loose grit from adhering to the walls and causing trouble later in service. The fan pulley is now flanged.



*Herschell-Spillman method of adjusting crankshaft endplay*

**T**HE Waukesha Motor Co. has made a change in its smallest engine, the Model BUX, 3 3/4 by 5 1/4 in., four-cylinder model, with the object of improving the operation of the engine under light loads. This change consists in the incorporation of a vaporizing device in the intake manifold which vaporizes the heaviest particles of the fuel that might otherwise get into the cylinders in an unvaporized state when operating with small loads at low speed. When bringing out its new line of engines, of which this particular model is one member, the Waukesha company greatly increased the depth of the crankcase and the diameter of the crankshaft to

overcome objectionable vibrations in truck work.

**T**HE Hercules Motor Mfg. Co. has made an improvement in the lubricating system of its models, CU, MU and T. This consists of the provision of an oil pressure regulator located at the forward end of the engine, close to the oil pump. Adjustment of the relief pressure can be made by removing a cap and adjusting a screw. This oil regulator is of the conventional spring pressed ball valve type. On the Series NU the main bearing studs have been increased in size from 1/2 to 9/16 in.

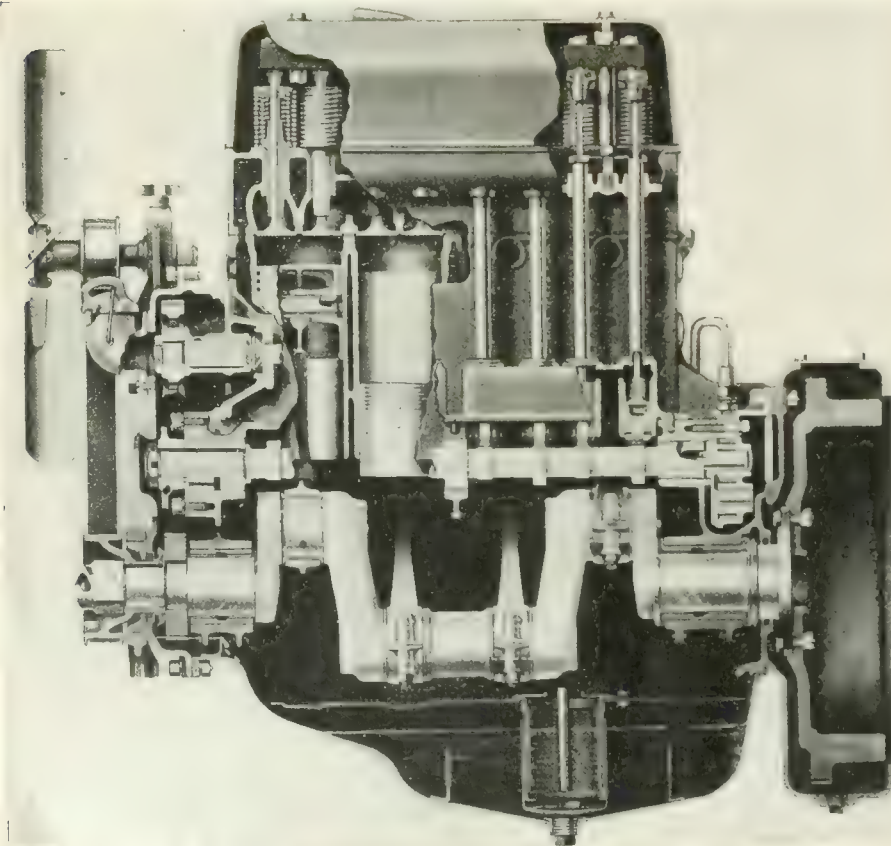
### Ruggles Speed Truck Engine

The company has just developed a new engine intended for 3/4 and 1-ton speed wagons, which has been adopted as standard equipment for the new light truck of the Ruggles Motor Truck Co. This engine is a four-cylinder, 4 by 5 in., and weighs slightly less than 600 lbs. The cylinder block and crankcase are cast integral, while the oilpan is of aluminum. The engine has a three-bearing crankshaft with force-feed lubrication to the main bearings. An output of 42 hp. at 2000 r.p.m. is claimed, and the engine is said to run without perceptible vibration at all speeds. The waterjacket runs the full length of the cylinder block, which is said to be exceptionally strong on account of the rigid supports for the three bearings. The caps of the main bearings are babbitted and poured out without the use of a supporting shell for the babbitt. Shells are used for the upper half of the bearing, however. There are no shells in the bearings of the connecting rods, the latter being first tinned and then having the babbitt poured into them. Cylinders and pistons are ground, the tolerances on the cylinder bore being plus and minus 0.001 in. The piston pin bearing is in the piston bosses, the pin being rigidly clamped in the upper end of the connecting rod.

The engine is supported at two points, having two arms cast integral with the bell housing and a third supporting point in the form of a trunnion, integral with the front cover. The engine is built for either thermo-syphon or pump cooling, and a "threwshaft" generator can be used with the magneto at the end when the engine is equipped for thermo-syphon cooling, or with a generator or distributor drive. If pump circulation is used, provision is made for a generator with distributor drive attached, or for a magneto. This engine is fitted with a separate ball housing, which permits of using either the No. 2 or No. 3 S. A. E. standard.

### Motor Bus Engine

**A** NEW engine model for use on motor buses, known as Model 4-L, has been developed by the Continental Motor Corp. This engine is adapted for vehicles for 4 1/2 to 5 1/2 tons total weight and especially designed to facilitate lubrication and to meet high speed motor bus requirements.



*Cutaway view of Midwest four-cylinder, two-bearing engine*



### Lighter Pistons

SEVERAL changes intended to insure more efficient operation have been made by the **Lycoming Motor Co.** Light pistons and connecting rods are being used, and bronze-back, babbitt-lined bearings have replaced the plain die-cast bushings in the main bearings and connecting rods.

**THE Midwest Engine Co.** has brought out in the course of the year a line of truck engines comprising three four-cylinder models with the following cylinder dimensions: 3½ by 5 in., 4½ by 5½ in., and 4½ by 6 in.

Perhaps the most interesting features of these engines is that they have a two-bearing counterbalanced crankshaft. The outputs of the different engines are as follows: the smaller engine, 39 hp. at 1800 r.p.m.; intermediate size, 47.5 hp. at 1600 r.p.m., and the larger engine, 61 hp. at 1500 r.p.m. The company has also developed a high-speed, heavy-duty engine for trucks, taxicabs and motor buses. This is a four-cylinder engine of 3¼ in. bore and 4½ in. stroke, and the maximum output is given as 33.8 hp. at 2400 r.p.m.

The general design of this engine is quite similar to that of the other three models, except that no counterweights are used on the crankshaft and the engine is designed for thermo-syphon cooling instead of pump cooling. A section view of the smaller engine is shown herewith.

### Control of Oil Flow

The chief features of construction are as follows: An exceedingly heavy crankshaft is used to prevent whipping, the diameters of all bearings being 2¼ in. Large oil passages are drilled through the crankshaft and part way through the camshaft and force feed lubrication is used. The rate of feed of the oil is controlled in accordance with the load on the engine and not by the speed. This insures an absence of excess oiling at idling or medium speeds and a light load and keeps down the temperature of the bearings so that the oil retains its lubricating properties.

The oil is delivered to all crankshaft, connecting rod and camshaft bearings under pressure generated by a self-priming gear-type pump, driven from the rear end of the camshaft. The feed of oil is controlled by the vacuum in the intake manifold. This reduces the pressure on the oil relief valve, when the throttle is nearly closed, and the suction is therefore strong.

The position of the oil leads in the crankshaft forces the oil out on the bottom side of the connecting rod bearings. No oil grooves or shims are used. There is no direct lead for the oil to pass out of the connecting rod bearings, which is said to insure an unbroken film from the point of entrance of the oil to the outer edges of the bearing. As a result, comparatively loose bearings can be used and friction reduced to a minimum.

There is no breather on the crankcase, but, instead, the crankcase is placed in

communication with the valve chamber on top of the engine through eight tubes surrounding the valve tappets. A breather of special design is placed on the valve cover. This arrangement involves a double advantage in that it causes a circulation of air carrying a mixture of oil to the valve chamber, thus insuring effective lubrication of the valve mechanism and at the same time tending to keep dust out of the engine. The weight of this engine with bell housing is approximately 425 lbs. and with open flywheel 390 lbs. The cylinders and upper half of the crankcase form a single casting. The cylinder head containing the valves is cast separately and the oil pan is a steel pressing. The connecting rod bearings are 2¼ in. in diameter by 1½ in. in length; the front main bearing measures 2¼ by 2½ in. and the rear main bearing 2¼ by 2½ in. Roller type cam followers are used. The valves have

a clear diameter of 1½ in. and a lift of ¾ in. The bell housing is a No. 4 S. A. E. standard.

**THE Buda Co.** has brought out two bus engines. These models are CBU, size 3¼ by 5¼, and EBU, size 4¼ by 5½. The smaller engine is for buses up to 25-passenger capacity. The larger engine is for buses with a 35-passenger seating capacity and an overload to about 50 passengers. This company will continue the standard line of engines designed for speed as well as heavy-duty trucks.

The following companies have made no changes in design during the past year: **Beaver Mfg. Co.; Hinkley Motors Corp.; Le Roi Co.; Supreme Motors Corp.; Turner & Moore Mfg. Co.; Golden, Belknap & Swartz Co.,** and the **Weidely Motors Co.**

## New Axle Designs

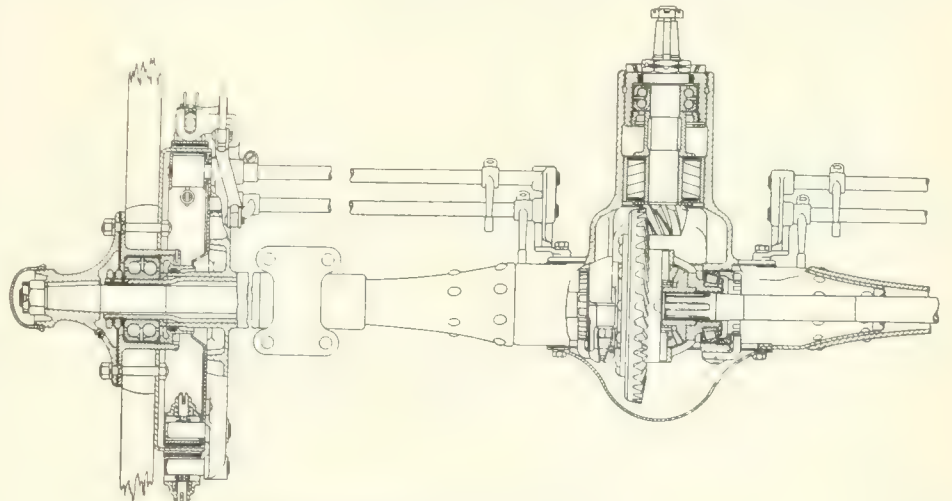
**DEVELOPMENT** in the design of motor truck axles continues to be intensive. A majority of the companies making these units have brought out new models during 1921. In most cases these new axles have been designed for high-speed trucks or motor buses. Improvements and advancement in design have been focused on the insurance of maximum strength and life of these units. A small number of the axle makers are contemplating changes in design and the introduction of new models, but are withholding full details pending the completion of plans.

**THE Wisconsin Parts Co.,** which manufactures a line of worm-driven axles, has during the past year made no decided changes in the design of these axles; but in the course of the year has brought out a new double-reduction type of rear axle. The advantages claimed for this type of axle may be briefly summarized as follows: The whole reduction

takes place at the center of the axle, where all gears and bearings can be securely supported and held in alignment, in which respect the double-reduction axle is similar to the worm-driven axle. The power of the engine is transmitted first through a pair of spiral-bevel gears and then to a pair of spur gears to the differential and driveshafts. The differential is combined with a second reduction set and is therefore much larger, rotating more slowly than it would if it were placed in the first reduction set. The axles are of the semi-floating or fixed-hub type, as shown in the sectional view.

### Special Types for Buses

In addition to the standard line of double-reduction axles, the Wisconsin company is now at work on a special type of double-reduction axle combining features which make it particularly applicable for motor buses and trackless



*New Salisbury spiral bevel-driven axle*



## Types of Rear Axles on 1921 and 1922 Gasoline Trucks

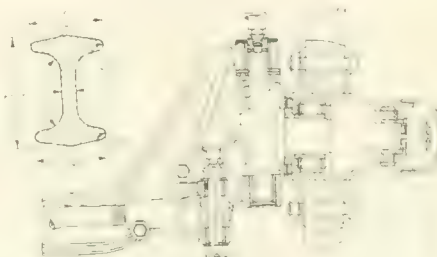
Type	1921		1922	
	No. of Models Supplied	Per Cent of Models Supplied	No. of Models Supplied	Per Cent of Models Supplied
Bevel	19	3.5	24	7.0
Chain	24	4.5	15	4.4
Double-reduction	7	2.2	15	4.4
Internal gear	114	21.5	48	14.0
Worm	361	68.3	238	69.0
External-gear	2	0.0	0	0.0
Not listed	0	0.0	4	1.2
	527	100.0	344	100.0

trolleys. One of the factors of importance in a motor bus is a low center of gravity permitting low floorboards, which mean convenience to passengers, and stability and safety of the bus. Accessibility of parts that require periodical repair is also essential. In collaboration with a number of prominent bus engineers, the company has designed an axle which, it claims, successfully meets these requirements, known as Model 120-K. This axle has a wide tread. The pinion shaft center is in a horizontal plane with the shaft proper, thus permitting of greater top clearance and providing for a straight-line drive with low floorboards.

The same brake system is employed on the double-reduction axles that has been standardized for the Wisconsin worm-driven line. The service and emergency brakes operate in separate drums that are arranged concentrically on the rear wheels. Experience has shown three decided advantages in this form of brake construction, as follows: When the brakes are being applied continuously, as is often necessary in hilly sections, the heat generated at one drum is not transferred to the other. This permits continuous use of the brakes, alternating the service of the emergency and foot brakes, without affecting their efficiency. It will also be noted that the brake camshafts are separated. Where one camshaft is located inside the other there is always danger of sticking and freezing. Another advantage of the concentric arrangement of the brakes lies in the practical impossibility of lubricant getting onto the service brakes. If any oil or grease should work its way through the double felt retainers on the drive shaft, it is caught by the inner drum, thus leaving the drums of the service brake dry.

## Types for Speed Wagons

**T**HE National Axle Co., which is manufacturing a line of worm-driven axles, has added a new axle suitable for speed trucks of  $\frac{3}{4}$ -ton capacity, as well as for taxicabs. In addition the company is manufacturing a worm-driven axle for speed trucks of 1-ton capacity.



Salisbury front truck axle

**A** NUMBER of improvements in design have been made by the **Torbensen Axle Co.** in its line of internal-driven axles. The pinion shaft mountings have been changed and S. A. E. standard tapers have been incorporated in the two smaller models. The object of the change in the pinion shaft mounting is two-fold, namely, to increase the bearing capacity so as to extend the periods between adjustments, and also to provide for gear adjustments without the necessity of disturbing the bearing adjustment. The changes referred to were made in axles intended more particularly for speed wagons and pneumatic tired trucks.

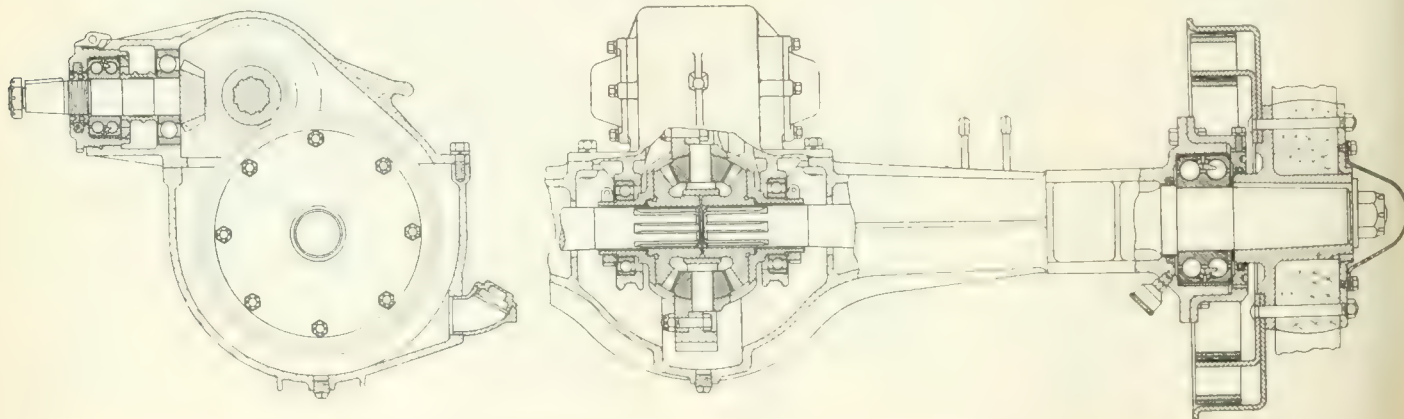
**T**HE Salisbury Axle Co. has recently brought out new front and rear axles for speed trucks. The rear axle is of the spiral bevel-driven type, the differential and driving gears being

of Brown-Lipe make and designed with coarse teeth to insure maximum strength and life. The pinion and pinion shaft are an integral part, made of alloy steel and heat-treated. The driveshafts are made of chrome-nickel steel, of tapering section and heat-treated, and they are given a Brinell test. The axle is of the three-quarter floating type which, it is claimed, combines the chief advantages of both the full-floating (ease of removal of shafts) and of the semi-floating type (reduction of loads on bearings and tubes when rounding curves).

The brakes are provided with adjustments for taking up wear on the lining. The axle tubes are made of extra heavy seamless steel tubing and are pressed into the housing center and riveted in place under heavy pressure. The driveshafts are rendered accessible after the removal of eight hexagon nuts on the driving flange, after which the driveshaft and flange can be withdrawn together, without jacking up the wheel, as the full load is carried on roller bearings in the hub. The brake shafts are mounted in oil-less bushings, thus eliminating the necessity for oiling inaccessible bearings. The differential gear carrier can be removed after unscrewing the cap screws which hold it to the housing.

The steering knuckles of the front axle are made of chrome nickel steel and are heat-treated to show a Brinell hardness of 325 to 360. The knuckle pins, tie-rod pins, knuckle pin bushings, tie-rod bushings and spindle thrust washers are made of carbon steel, carbonized and hardened to show a scleroscope hardness of between 75 and 85, the parts being ground after hardening.

**T**HE Russel Motor Axle Co. during the past year developed a new line of truck axles of the internal gear-driven type. These possess the same characteristics and embody a good many improvements over previous designs. An entirely new design of  $1\frac{1}{2}$ -ton capacity was also brought out. In this axle, spiral bevel driving gears are used for the first reduction set, thus insuring a degree of quietness not obtainable with straight tooth bevel gears. The pinion shaft is machined with ten splines for the universal joint flange. An improved four-pinion type of differential gear in-



New double-reduction axle brought out by Wisconsin Parts Co.



corporates hardened and ground thrust washers. The jackshaft pinions are mounted upon the jackshaft in such a manner as to permit removal without disturbing the jackshaft. An enclosure for the jackshaft pinion bearing is provided. An enclosure for the internal gear and jackshaft pinion is fitted to protect these parts from dirt and also retain the lubricant. Provision is made for adjusting the brake lever and the wheel bearings.

**THE Clark Equipment Co.**, maker of internal gear-driven truck axles, brought out, during the latter part of 1921, two new bevel-driven axles of 1 and 1½-ton capacities especially adapted for speed truck work. The axles are designed for Hotchkiss drive. A feature of their design is the short pinion shaft which reduces the overhang of this member which has a straddle mounting. The entire shaft assembly is mounted on a pinion carrier which can be easily removed from the axle. The wheels are said to be readily removable and replaceable, and they are so arranged that they can be placed only on the correct hub. The wheel bearings are designed to take thrust in both directions, this practice being considered preferable to that of transmitting the thrust from the inside through the shafts to the bearing on the opposite side, as is commonly done in passenger car axles.

**THE Walker Axle Co.** has made no radical changes in its line. A new model, designed along the same general lines of its present standard models, has been brought out. This is suitable for application on trucks of 2½-ton capacity.

**THE Continental Axle Co.** is contemplating changes in the design of its product. Details covering these changes will be brought out in a future issue of this publication.

**THE Sheldon Axle & Spring Co.** has made no changes in its present design, but is working on a new bus axle.

No changes in design have been made by the **Vulcan Motor Axle, Corp.**, the **Iron Mountain Co.**, the **Columbia Axle Co.**, and the **Eaton Axle Co.**

**THE U. S. Axle Co.** is featuring the Allen gearless differential which is of the self-locking type. This differential was on the market for some time prior to 1921, when the U. S. Axle Co. took control of its manufacture and distribution.

**THE Flint Motor Axle Co.** has brought out a new speed wagon truck axle which is of the conventional ¾-floating type with removable shafts. The wheels are supported on one double row ball bearing and the housing which carries the load is of a built up form. Lubrication has received special consideration. An oil guard has been used at the sides of the differential to catch the overflowing oil which has a tendency to follow the main shaft out towards the wheel. This guard will catch the oil and it will be drained back into the gear case reservoir.

# New Truck Wheels

Types of Wheels on 1921 and 1922 Gasoline Trucks

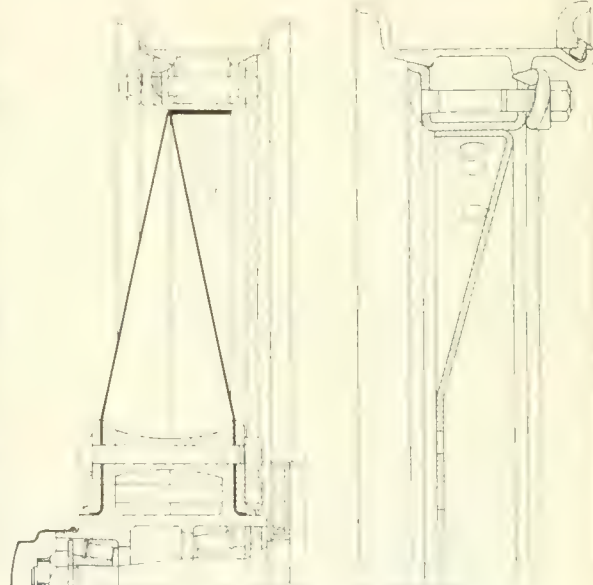
Type	1921		1922	
	No. of Models Supplied	Per Cent of Models Supplied	No. of Models Supplied	Per Cent of Models Supplied
Wood	334	63.4	203	59.0
Metal	190	36.1	126	36.6
Not listed or doubtful	3	.5	15	4.4
	527	100.0	344	100.0

**M**OTOR truck wheel design during the past year has taken account of the demand for lighter weight, more resiliency and strength. In the wood wheel field there has been a tendency to dispense with the wooden felloe and to replace it with a steel rim. In the large truck sizes, a wheel of this type is claimed to weigh 25 to 30 per cent less than the wooden felloe type of wheel. In the metal wheel field further reduction in weight has

limit on the permissible weights of trucks. The five-spoke wheel was originally developed by the Dayton company some years ago, but at that time it did not meet with much favor on account of the rather radical departure from principles that have been applied to wheel design for centuries. The weight of a set of four wheels for a two-ton truck, as now offered by the Dayton company, is approximately 100 lb. less than the weight of a similar set of wheels



Smith cushion metal truck wheel



Double and single disk Indestructible wheels built for all sizes of trucks

been brought about through redesigning and by improved manufacturing methods, such as the adoption of metal patterns. The past year has seen the introduction of new cushion wheels, designed to give better solid tire cushioning. The pressed steel disk wheel has come into use on speed trucks.

## Lighter Truck Wheels

**THE Dayton Steel Foundry Co.**, manufacturer of steel truck wheels cast from electric furnace steel, during the past year has considerably lightened its wheels. A demand for lighter truck wheels arose in connection with the propaganda in several States to place a

a year ago. The weight reduction is even more noticeable in the case of a set for five-ton trucks, amounting to about 250 lb. This lightening of the wheels is the more important because the weight eliminated is unsprung weight.

In order to produce smoother castings, the company has installed metal patterns and equipment for handling them. This is said to have resulted not only in smoother castings but in fewer shifts and a minimum percentage of scrap.

**THE Bethlehem Steel Corp.** during the past year brought out a rolled steel truck wheel of which the rim and spokes are formed in one piece. The blank from

which the wheel is formed is stamped in the first instance from a special rolled I-beam, the portions of this which form the spaces between spokes being cut away before the forming operation is started. The wheel is thus a rigid structure which is said to compare favorably in weight with a wooden wheel, and to be amply strong enough to withstand the most severe radial loads and side thrust as well as torsional strains.

**FRENCH & Hecht** have brought out a new type of truck wheel, similar in construction to the metal wheels which have been used so extensively for agricultural machinery. Round solid spokes are forged into both the hub and the rim and are held rigidly by substantial heads and shoulders. This firm has been making wheels of this type for the last thirty-five years. The new wheel, it is stated, is designed so that it can be interchanged with the wheels on a truck. Particular attention is called to the rim construction, which embodies a continuous wedge ring with bolts passing completely through the center of the ring, thereby giving a straight pull without the usual clips. While the illustration shows the wheel equipped with a demountable tire, it is the intention of the manufacturers to produce it in the detachable form also.

### Felloeless Wheel

**HOOPE Bros. & Darlington, Inc.**, have designed a wooden wheel which has no wooden felloe. An inverted channel section takes the place of an S. A. E. band as well as the wooden felloe. As the spokes have a complete bearing on the end grain on the metal, the makers claim that they have done away with the weakest point of the wood wheel—that is, the seating of the spoke shoulder in the wood felloe. In

retaining the wooden spoke in this wheel, the shock absorbing qualities of the wood is retained, while at the same time it is claimed that maximum strength is procured. In the large truck sizes, it is stated that this wheel weighs 25 to 30 per cent less than the wood felloe wheel.

### Cushion Wheels

**THE Smith Wheel, Inc.**, which has for some years manufactured cast metal wheels, has brought out a cushion metal wheel which is designed to give simplicity and light weight as well as proper cushioning with solid tires. The wheel itself has only four parts—the wheel, cushion, steel locking ring, and cushion retaining rim. The cushion consists of rubber with air pockets, and is placed between the felloe band and a second metal band on which the solid tire base is mounted in the usual manner. The air spaces are interconnected with channels which permit air to circulate in the periphery of the wheel and thus convey generated heat to the metal from which it is radiated. The cushion wheel differs but little in appearance from other cast spoke wheels made by the same company.

**THE Morand Cushion Wheel Co.**'s cushion wheel is interchangeable with and replaces any pneumatic truck tire without wheel change. A cushion of live rubber is bolted top and bottom between steel channels. In action, this cushion provides equal distribution of resiliency throughout the entire circumference of the wheel, so that no one portion receives the entire burden.

### Disk Wheel

**A** DOUBLE disk pressed steel wheel for a motor truck has been brought out by the **Indestructible Wheel Co.** This wheel is being manufactured for all standard size trucks and made to fit all axles, and has been improved by a new bracing center, for which a patent has been applied. The Indestructible company has recently brought out a single-disk wheel for speed trucks. This includes a cone disk to be secured to the hub flange by means of bolts. It is provided with a wide lateral flange at the circumference to which a steel felloe is secured. The wheel is provided with demountable rims. The center hole of the wheel disk can either be drawn or bored straight to fit the hub. The holes can be of any number and size to suit the design of the hub flange. The wheel is designed for a Firestone demountable rim.

**THE West Steel Casting Co.** is placing on the market a new cast steel wheel for the  $\frac{3}{4}$ -ton speed wagon type of truck. This wheel weighs but 150 lbs. for the set of four, exclusive of the tire rims. The hub is cast integral with the wheel.

Among those wheel companies which have made no changes in design during the preceding year are the following: **Clark Equipment Co.**, **Dayton Automotive Wheel Co.**, **Hart-Parr Co.**, **Motor Wheel Corp.**, **Muncie Wheel Co.**, **Phineas Jones & Co.**, **Standard Wheel Co.**, and the **Sivyer Steel Casting Co.**

## The New Clutches

Types of Clutches on 1921 and 1922 Gasoline Trucks

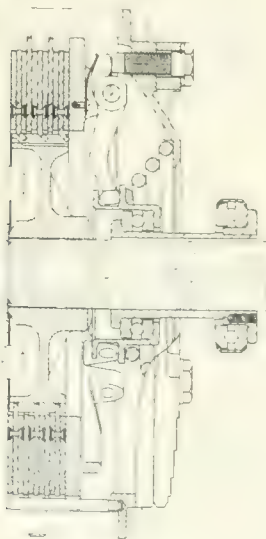
Type	1921		1922	
	No. of Models Supplied	Per Cent of Models Supplied	No. of Models Supplied	Per Cent of Models Supplied
Dry disk	379	72.1	285	82.9
Dry plate	95	18.0	40	11.6
Cone	30	5.7	11	3.2
Wet disk	14	2.6	6	1.7
Wet plate	5	0.9	0	0.0
Not listed	4	0.7	2	0.6
	527	100.0	344	100.0

**I**N the truck clutch field the tendency seems to be entirely toward the dry-disk type, either single-disk or multiple-disk. Over 80 per cent of the trucks this year are using dry-disk clutches. This amounts to an increase of 10 per cent over the 1921 figures. Out of a total of 344 truck models, 285 are equipped with this type of clutch. The dry-plate type is used on over 11 per cent of the 1922 trucks.

A good many of the manufacturers specializing in the dry-disk type of clutch made minor improvements or added new models during the course of last year.

**THE A. J. Detlaff Co.** is now using radial thrust bearings on all of its clutches instead of the straight thrust bearings formerly used. It has also adopted woven asbestos linings.

**THE Borg & Beck Co.** early last year brought out a new 14-in. heavy-duty truck clutch to meet a demand for a single-plate clutch that would satisfactorily transmit a torque of as high as 350 lb.-feet. The area of the friction surface is 100 sq. in. and the unit pressure on this surface approximates 30 lb. per sq. in. The drive is transmitted from the friction-disk to the shaft through a



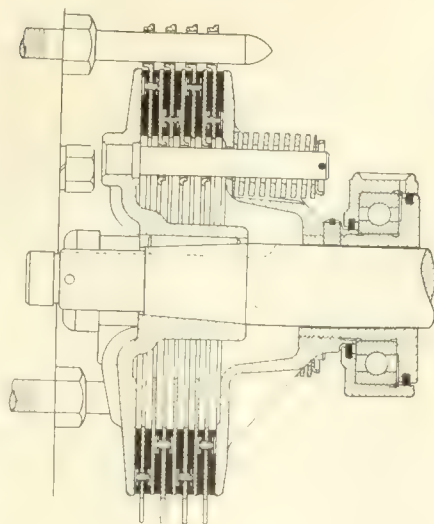
M & E heavy-duty dry-disk truck clutch



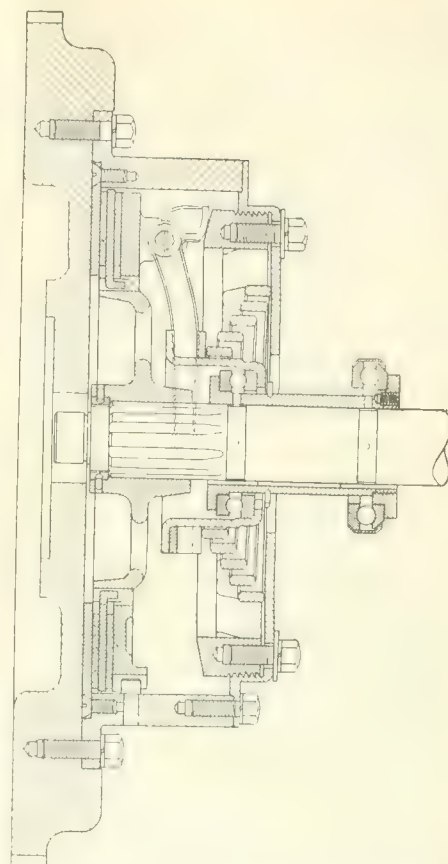
1¼-in. diameter, 10-spline S. A. E. standard fitting. Lubrication of the splines is provided for by the turning of a groove centrally located in the bore of the friction disk. Any tendency of the mounting ring to spring and cause drag when the clutch is released has been eliminated by fastening the mounting rigidly to the cover.

### Interchangeable Parts

**T**HE Hoosier Clutch Co. has brought out a new single-plate clutch model which, however, can be built as a duplex type, being so designed that practically all of the parts may be interchanged, the 10-in. duplex size replacing the 12-in. single plate. This makes it possible for the truck manufacturer to service Hoosier clutches by carrying only one size of clutch parts. By inclosing both the single-plate and the duplex clutch in a housing, making these clutches self-contained, the assembling of the clutch on the chassis is facilitated, the cost of the flywheel reduced and alignment within the clutch itself is assured. This company is now manufacturing clutches only, having discontinued the manufacture of transmissions, universal joints, speed change levers, torque sets, etc. The single-plate clutch is made in 8, 10 and 12-in. sizes and the duplex clutch in 8 and 10-in. sizes.



*Above — Detlaff clutch, which now uses radial thrust bearings instead of straight thrust bearings. Woven asbestos linings have also been adopted*



*At right — New single-plate Hoosier truck clutch, which has parts that are interchangeable with duplex type of clutch. Only one size of clutch parts need be carried in stock as a result of this change*

### Automatic Oiling

**F**ULLER & Sons Mfg. Co. in its unit type models of clutch and transmission, now provides automatic oiling for the clutch throwout bearing. The oiling method is said to have been worked out in such a way that while the throwout bearing will receive sufficient oil, there will be no excess of lubricant added to it. In addition, all models are now provided with an oil-level filling hole. Oil is poured into the transmission until it reaches the filler hole. The latter therefore serves as a gage to show the right amount of oil to put in. This improvement was made primarily to prevent the operator from putting an excess of oil in the transmission case, with the idea thereby of obviating the need of replenishing the oil supply at short intervals.

**T**HE Merchant & Evans Co. has added a heavy-duty dry-disk type of clutch, as shown in the accompanying illustration. It will be seen that although this is a multiple-disk type, the pressure of the clutch spring is multiplied by radial levers of which there are three to each clutch. A handy adjusting device is provided. The thrust of the clutch spring is taken up on the ball thrust bearing, and the clutch throwout collar also is in the form of a ball thrust bearing. The clutch drum is mounted on the clutch shaft with a splined fit.

**L**ILLIARD Clutch & Machinery Co. is bringing out a new clutch model intended for speed trucks.

**T**HE Warner Gear Co. has made no changes in its clutch design to date.

## New Gearset Models

**A**LTHOUGH there has been a considerable development in the design of transmissions for motor trucks, in the way of providing additional speed changes, the manufacturers of truck parts, with one or two exceptions, do not seem to have introduced any additional models during the past year.

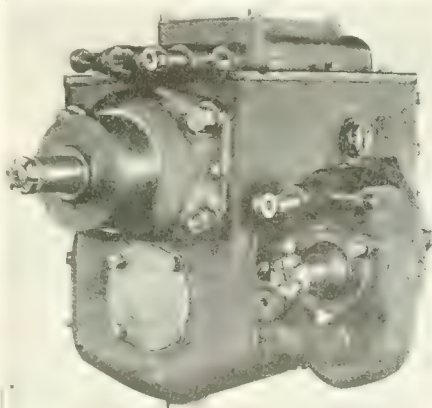
**O**NE of the exceptions is the Fuller & Sons Mfg. Co., which has brought out two new models. Its model SU-1, for speed trucks up to 1¼-ton capacity, has a low gear ratio of 4 to 1, while its model J, limited to trucks of ¾-ton capacity, has a low gear ratio of 3½ to 1.

This firm strongly advocates the detachable power takeoff and believes in selling the transmission with a power takeoff opening so that a power takeoff may be mounted at any time.

These transmissions are provided with the S. A. E. short-length mounting for power takeoff, the latter being designed accordingly. They are placed over the constant-mesh set, the power takeoff gear meshing with a large gear on the countershaft. All models of transmissions of this company are also provided with openings for tire pumps according to the S. A. E. standard. In some cases the tire pump opening is over the reverse idler gear and in other cases over the large countershaft gear of the constant-mesh set.

**T**HE Brown-Lipe Gear Co.'s Model 55, brought out early last year, is of the mainframe type. Regular features are selective gears that give four speeds forward; a rear mainshaft bearing cap that takes a speedometer drive, and two S. A. E. standard pads, one on the right and one on the left side of the case, and respectively intended for a one-speed power takeoff and a pump. Optional arrangements include either overhead or side shift.

Both the Warner Gear Co. and the Durston Gear Corp. state that no changes were made during the past year.



*Fuller gearset with power take-off*



# Universal Joints

UNIVERSAL joint development during the past year has been most progressive. The rapid growth in the demand for speed trucks has brought about changes in design that have been planned in most cases to cope with these new conditions. Higher propeller shaft speed accompanied by increased vibration or whip at high operating speeds has been a problem that has been instrumental in the introduction of new models and changes. The makers of propeller shaft sets have eliminated as far as possible all vibration or whip. Other changes have been worked out with a view toward increased life, proper lubrication, lighter weight and protection against mud and dust. In one or two cases a radical departure from standard lubricating practice has been effected, one maker substituting oil for grease.

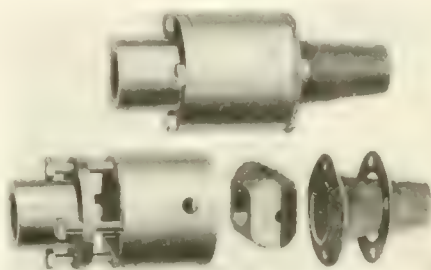
A TYPE of universal joint that is lubricated entirely by oil has been brought out by the **Hartford Auto Parts Co.** It is of the tubular crosspin type with an internal oil reservoir extending the full length of both pins, affording capacity for a liberal supply of oil. Centrifugal force throws the oil to the end of the bushing retaining sleeves from where it is fed by capillary attraction to the bearing surface of the bushings and pins. A packing of rectangular section completely encircles the working surfaces at the inner face of the bushings and excludes all foreign matter and dirt. These packings are held in position by clamp bands and are readily removed without disassembling the joint.

Refilling of the joint is accomplished by the removal of a single plug at the top of any of the four bushing retainers, shown in the accompanying illustration.

A separate chamber is provided for oiling the spline shaft, independent of the joint proper, allowing this member to work continually in a bath of oil. It is claimed that it is absolutely impossible for dust or any other foreign matter to reach any of the working surfaces.

## Other New Developments

THE Peters Machine & Mfg. Co. has developed adapters which are claimed to make the front and rear universal joints perfect units and allow rapid assembly to companion flanges on the



Pick universal joint for power take-off purposes

transmission and on the axle. The cross pins are now subjected to a special heat-treatment to increase the life of their wearing surfaces. A spline sleeve covers the entire spline shaft and serves as a lubricant retainer, thus insuring proper lubrication of the spline sliding joint. A patent on this feature has been applied for. The protective sleeve at the same time protects the spline shaft from mud and dust, thus increasing its life. The spline shaft is now made from a heat-treated steel and is hobbled and

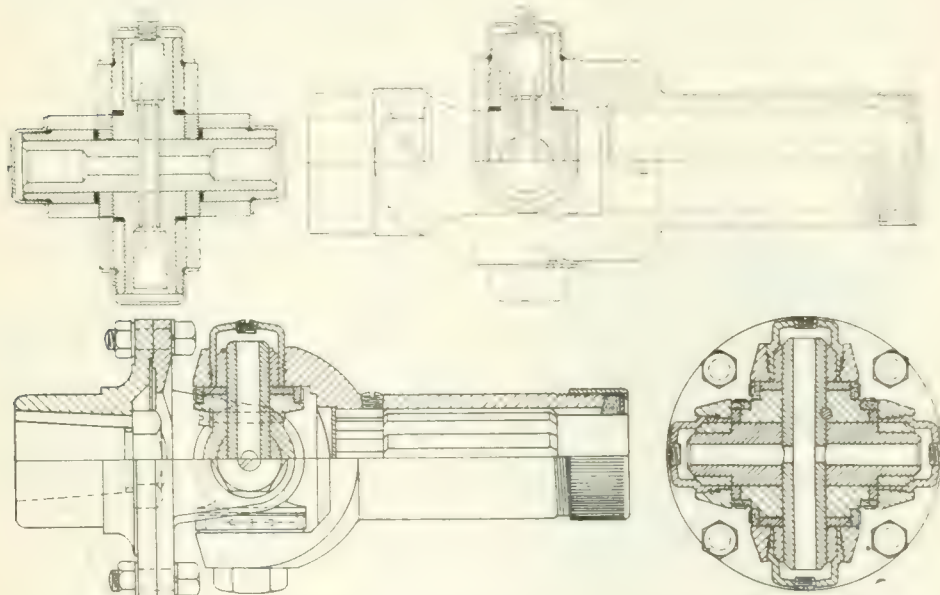
ground to close limits. This company manufactures six different sizes of universal joint assemblies, four of which are for truck use.

BLOOD Bros. Machine Co. has made a refinement in its joints whereby the lubrication of bearings is facilitated. This improvement is illustrated in the drawing. The new joint is known as the Model B, and it is claimed that the refinements made in the design insure substantially better service because of the improved lubrication, lighter weight and reduced number of parts. Referring to the accompanying drawing, the lubricant (heavy oil or soft cup grease) is forced to all of the bearings under pressure and lubrication of the bearings is maintained by centrifugal force. The knurled bushing is developed as a safeguard against the turning of the bushing in the yoke gear. The same section also shows how the cap is permanently locked in place.

SNEAD & CO. state that the general tendency in universal joint design during the past year has been to reduce the weight of propeller shafts and universal joints to a minimum and to eliminate as far as possible all vibration or whip at high operating speeds. This feature is especially important at the present time because of the tendency of automotive engineers to utilize high-speed engines for trucks as well as for passenger car work. This means in most cases a much higher propeller shaft speed, and universal joint manufacturers are compelled to make changes to meet these conditions. Snead & Co. produce ten different sizes of universal joints and propeller shaft units, all of the same general design. They specialize on four or five sizes. The feature of the Snead unit is the use of nickel alloy steel, electrically heat-treated tubing which permits of the use of light wall thicknesses and consequently low weight.

THE Carl Pick Co. has brought out a small universal joint, primarily for power takeoff purposes in connection with dump body hoist equipment. This joint is provided with a positive means of lubrication and lubricant retention. In addition to this joint, the Pick company is manufacturing a metal joint for the drive shaft in which the power is at all times divided between four trunnion bearings. Most of the metal universal joints now in use comprise a central cross or equivalent part, and two forks connecting with the cross or ring, at right angles to each other. Thus the power is transferred from one fork to the cross or ring through two trunnion bearings, and then from the cross or ring to the other fork through the other two trunnion bearings. The bearings in the Pick design are arranged to slide in longitudinal slots in the ring which forms one member of the universal.

THE Universal Machine Co. and the Universal Products Co. made no changes during 1921. The former, however, will make changes for 1922 which will be announced in the near future.



Above—Blood Bros. universal joint with special lubricating features. Below—New Hartford universal joint which is lubricated entirely by oil





## Looking Ahead!

THE old year has gone and taken its troubles and its worries with it.

A new year with new opportunities and new possibilities lies ahead of us all and now is the time to look about us, take stock of our mental and moral equipment and set our faces resolutely ahead, with courage and determination in our hearts.

Only a fanatical optimist could argue that the past year was a good year for the truckman and for the industry generally. That is, it has not been a good year in a business way, *by comparison with other years.*

Looked at in another way, however, *1921 has been the best year yet in the history of trucks and trucking.* For in 1921 trucks performed more vital service to the country as a whole than ever before. They carried more freight, they opened up more new territories, they gave better service, they approached closer to ultimate standardization in design and they came closer to a fully favorable public recognition than ever before. Moreover, buses in 1921 leapt for the first time into the public eye and into general recognition and consideration, if not general use.

Stop and consider what this means to you and to the industry generally. It means that 1921 has proved once and for all that the truck—and probably the bus also—is, on the one hand, a gigantic, firmly established and far reaching industry; and is, on the other, a vital link in our national economics and a vital factor in our national life.

Further, it means that we are all factors, large and small, in one of the greatest industries of modern times. Whatever may happen to the individual—and no industry, however vital, can lay claim to successes only, among the men who have helped to build it—the business itself is founded on a rock and *the rest is up to the individual.*

That is the lesson of 1921. So take a leaf from the book of the Christmas season just past, and “Let nothing you dismay.”

With the heartening knowledge in our minds that we are bound up with a great and growing industry, which, as a whole, has an almost limitless future before it, the next thing to do is to turn our eyes inward for a little.

It would be useless to attempt to prophesy what 1922 has in store for the truck business and the truck industry. To a certain extent, what the future will bring depends upon business conditions. But to a far greater extent, it depends upon what the men in the truck business and in the truck industry put into the future.

There is no capricious fate waiting around the corner for us. But there are a certain number of eternal verities lying in wait for us at all times. And one of these is that we get out of our lives and our businesses what we put into them. Another is that without faith we can accomplish nothing.

Gazing apprehensively into the future will do no good. But perhaps a little overhauling of our own fixed ideas, our own limitations, our intentions, our determination and *our vision*, may do a little good.

In the past perhaps we have been too prone to accept the easiest course—to be satisfied with the second best—in what we put into the industry. Let us correct this in the future.

In the past we have lacked vision, failed to realize the greatness of the future of our industry and so, being penny wise and pound foolish, reaching after big immediate returns and failing to build patiently and economically for far larger returns later on. Some of us have done our best to kill the goose that laid the golden eggs. We have not succeeded. But sometimes the goose has refused to put up with such treatment and has not remained in the vicinity. Let us take stock of the situation and realize, as individuals, the greatness of the business in which we find ourselves. Then let us see what we can do as individuals, having that vision, to further and hasten its accomplishment. For no man who realizes that, in spite of fluctuations, there is a great upward sweep to the fortunes of the truck business, can fail to be an optimist at heart.

Lastly, let us all realize—as we have sometimes failed to realize in the past—that we are building now, to-day, one of the greatest and most far-reaching industries that the world has ever known. And by realizing this and putting into this work the very best that is in us—as such an industry deserves—let us make 1922 for all of us: “A Happy and Prosperous New Year!”



## Overloading Rare in Oregon

### State Traffic Officer Finds Drivers Have in Most Cases Obeyed Laws

PORTLAND, ORE., Dec. 16.—That drivers of for-hire motor trucks are not the offenders against State traffic laws to the extent that is generally claimed, and that the drivers are living within the requirements of the law both as to weight of load and speed and therefore are not damaging the highways to the extent that is charged in many quarters, seemed conclusively proved this week, when the State traffic officer, T. A. Rafferty, made public a report showing the activities of his department with loadometers during the months of August, September and October, this year. The motor truck is coming in for more than its share of criticism throughout the entire Pacific Northwest at this time, it being claimed by opponents to the truck that trucks are breaking up the roads by overloads and excessive speed.

Loadometers were first put in the hands of the State traffic officers late in July, according to the report, and during August, the first month of operation with this new truck weighing device, a total of 422 trucks were stopped by the officers and of this number 236 were considered subject for investigation and were weighed. But twenty-nine were found to be overloaded to any degree, and of this number, but five had overloads of more than 1 ton. In over a fourth of the cases the load could have been shifted slightly and made to conform to the law.

During September 611 trucks were inspected and of this number 192 were weighed. A total of thirty-four were found overloaded, but the overload in this case averaged but 750 lb. per truck, a considerable reduction over the month previous. In October 164 trucks were weighed and thirty reported overloaded.

In view of the fact that hundreds of motor trucks were constantly plying on the highways during those periods, which were so obviously not overloaded as not to be subjected to investigation by the officers, it is considered that the report is highly satisfactory and goes a long way toward proving that the truck is not the violator of State law and the destroyer of highways that is claimed.

### To Standardize Cabs

NEW YORK CITY, Dec. 24.—Owing to the larger number of purposes for which motor trucks are used, it is the universal practice of all truck builders to sell motor trucks without bodies or cabs, these units being obtained by the chassis purchaser. As bodies and cabs are not interchangeable on different makes of trucks of the same capacity, it is necessary for motor-truck chassis buyers to place special orders for bodies and cabs.

Motor truck users and body and cab

## MOLASSES REVEALS WATER IN GASOLINE

MILWAUKEE, Dec. 19.—Little dabs of cheap molasses on plain pine sticks in the hands of oil inspectors in Wisconsin have saved users of gasoline thousands of dollars this year. This simple test to discover water in gasoline was first used in Minnesota, but has been adopted as an official means of testing by the State oil inspector's department of Wisconsin.

The theory is that water is heavier than gasoline and always sinks to the bottom. A stick dipped in cheap molasses glides through gasoline without showing any effect on the molasses. But when water is encountered, the molasses comes off the stick. When the stick is withdrawn, the exact amount of water in the tank is clearly revealed by the discolored fluid.

makers fully appreciate this most uneconomical situation, but as the quantity production of bodies and cabs is absolutely impossible owing to the variation in the mounting dimensions for the different types and makes of truck chassis, they are powerless to remedy the situation.

This condition is to be discussed by the truck makers' committee of the society of Automotive Engineers' Standards Committee. It will probably be found necessary to establish two cab widths or seat lengths owing to the larger crew usually carried on the heavier trucks and also to appearance. Instruments will probably have to be attached to a dash furnished as a part of the chassis. This would save a large amount of time in equipping trucks with cabs, as no instrument connections would have to be disturbed.

### Gary Creditors Plan Country-Wide Branches

CHICAGO, Dec. 19.—Judge Carpenter, sitting in Federal Court at Indianapolis Saturday, appointed Charles Surprise, clerk of the Federal Court at Hammond, Ind., custodian of the property of the Gary Motor Truck Co., succeeding G. M. Semmes, who was appointed receiver by the Superior Court of Gary. Frank Dawson, president of the Gary Motor Truck Co., states that he has enough money to refinance the company, thus keeping it out of a receiver's hammer sale.

His plan will mean that all the old stockholders will lose all their stock but that the creditors will be paid in full. In case of a forced sale it is said that the creditors will not realize more than 30 per cent.

If the reorganization planned by Dawson goes through, the new company will be capitalized for \$5,000,000, will operate its own branches throughout the country and will build a business wagon in the speed class.

## Flat Trade-In Value Given Trucks

### International Harvester Will Periodically Inspect All Vehicles in Use

CHICAGO, Dec. 24.—Plans to take care of the used trucks coming into its dealers' hands have been perfected by the International Harvester Co. and will be in force during 1922. All trucks of a certain issue, regardless of condition, will be given a flat trade-in value. In other words, every 1919 International Harvester truck of a certain model will have the same trade-in value.

In standardizing the value of these used trucks, the owner, the dealer and the company are protected to a great extent by the periodical inspection of all International vehicles by road engineers and what amounts to almost enforced servicing of these trucks when they are found by the inspectors to need repair or adjustment.

The owner of the truck is not obligated in any way to service his truck upon recommendation of the company's engineer, but he is advised to do so and arguments are advanced as to why the work should be done.

### Lavine Steering Gear for Buses

MILWAUKEE, WIS., Dec. 16.—The Lavine Gear Co., this city, has brought out a new Model 2200 steering gear specially designed for heavy motor bus work. This embodies the same principles as the other models of the Lavine gear, of which there are now six in all.

### Motor Truck Association Elects New Officers

NEW YORK CITY, Dec. 22.—At the regular annual meeting of the Motor Truck Association of America last night the following new officers were elected for 1922:

Thomas R. Freebody of Louis K. Liggett & Co., vice-president; H. A. Bragg of Eggleston Bros., E. E. Lashumm, American Railway Express Co., and H. C. Shmadeke, Jr., Commonwealth Fuel Co., directors.

Officers who served this year and who were re-elected are:

L. E. Campbell of Lalance & Grosjean Mfg. Co., president; Hermann Irion of Steinway & Sons, and C. M. Geiger of Peter Doelger, vice-presidents; Charles O. Kramer of Vacuum Oil Co., secretary, and Nat Mallouf, of Motor Haulage Co., treasurer. Directors: W. P. Held of Sterling Motor Truck Co.; E. P. McDowell of Hecker-Jones-Jewell Milling Co.; David C. Fenner of International Motors Co.; J. B. Dolan of P. Brady & Son Co.; Henry V. Middleworth of Consolidated Gas Co. of New York; G. A. Green of Fifth Avenue Coach Co.; Henry K. Jaburg of Jaburg Bros.; Emanuel Lascaris of G. W. Goethals Co. and Arthur G. Freeland of Bernheimer & Schwartz.



## Truck Resale Prices Discussed

### Philadelphia Truck Association to Confer with Owners on Used Truck Problem

PHILADELPHIA, Dec. 21.—At its December meeting, tonight, the Motor Truck Association of Philadelphia took active steps toward solving the problem of the proper resale prices of trucks by appointing at the close of a lively discussion, the chairman of a committee to call a meeting of sales managers of the truck dealers to obtain data direct from consumers and to devise ways and means of adjusting the matter to the satisfaction of both dealer and truck owner. Charles F. Woltz was chosen to head this committee which will soon be completed and report its findings to the association.

The plan developed from the general suggestion made in his address on "The Used Motor Truck Problem," by Samuel W. Traylor, president of the Traylor Engineering Co., for close association of manufacturers, dealers and users of trucks, whereby all second-hand trucks should be inspected and appraised by a competent authority, trucks passing such inspection entitling the dealer to a certificate permitting him to place the job on sale; and trucks rejected by the inspector as outworn to be scrapped immediately, after the manner of destroying old tires now in favor with some concerns.

The following were declared elected:

President, Thomas K. Quirk; vice-president, D. H. Zimmerman; secretary, for the ninth successive term, W. H. Metcalf, and treasurer, W. Ross Walton; directors for two years, Walter Y. Anthony and H. A. Neill; directors for three years, W. A. Manwaring, George B. Shearer and H. O. Stahling.

### Buses Win in Saginaw

SAGINAW, MICH., Dec. 16.—In a preference vote taken in this city, motor buses have won over street car restoration by a large majority. By the terms of the question voted on the City Council is now obliged to resume consideration of some form of bus transportation.

### California Motor Transport Association Formed

FRESNO, CAL., Dec. 16.—The California Motor Transport Ass'n. has been formed with headquarters in this city. The promotion of adequate highways and the regulation and elimination of present abuses is the aim of this association. Directors of the association, which will be state wide in its scope, are: V. D. Mitchell, president of the Valley Bank, Fresno; F. A. Seymour, assistant to the president of the California Associated Company; W. L. Matlock, district manager Union Oil Company, Fresno; H. F. Allardt, general manager Central California Ice Company, Fresno; and Red Eckley, San Joaquin Baking Com-

## PREDICTS 50 TO 100 MILES ON GALLON OF GASOLINE

DETROIT, Dec. 16.—Fifty to 100 miles per gallon of gasoline is a development in the motor vehicle industry not far removed, according to C. F. Kettering, president of the General Motors Research Corp. and vice-president of the General Motors Corp.

"Increased mileage will come about through a change in the method of refining gasoline," Kettering said. "We know there now is a constructive attitude on the part of the oil companies to refine oil along the right lines. It is possible today easily to double the mileage, and when this has been done a lot of trouble with the motor vehicles will be solved, such as elimination of carbon.

"The use of gasoline was more or less accidental," Kettering explained. "No one asked if it was the right thing for the motor car. It was the nearest thing at hand. Gasoline was then simply a by-product almost to be had for the asking."

pany, Fresno; Fred Mott, formerly Fred Mott, Inc., Fresno; John R. Graham, Merced; E. M. Saunders, Madera; T. J. Black, Visalia; G. H. Galbraith, Bakersfield, and Henry Chambers, Hanford.

### Buses Defeated in Battle Creek Referendum

BATTLE CREEK, MICH., Dec. 19.—Citizens in this city during the special election on Dec. 17 decided by a vote of nine to one in favor of the trolley car. The City Council is now obliged to ban buses on streets served by the electric line.

Under the conditions of the referendum, the Michigan United Railways agreed with the city to pay election expenses and abide by the voters' expression in the matter of future service.

### Mason City Line Started

CHARLES CITY, IOWA, Dec. 23.—The Mason City Transportation Bus Line has started a bus line from Mason City to Charles City and buses are run each way three times a day. The distance is 30 miles with paving all the way excepting about 2 miles. There are several small towns along the route. The patronage of the bus line is good and on the increase from both points and all the localities along the route.

### U. S. Rubber Has New Tube

NEW YORK CITY, Dec. 17.—A new inner tube has been placed on the market by the United States Rubber Co. It will be sold under the name of Royal Tube. Improvements in construction are said to give the tube increased life.

## Road Costs Figured for Truck Taxes

### Oregon Figures \$3,000 Necessary to Maintain One Mile of Pavement for One Year

PORTLAND, ORE., Dec. 17.—As a basis on which to consider what additional compensation should be paid the state by motor trucks and motor buses, Herbert Nunn, State Highway Engineer in Oregon, has submitted figures relative to the cost of highway maintenance.

According to Nunn's figures, the cost to the public of Oregon for maintaining one mile of pavement for one year is \$3,000, while the cost of maintaining a mile of macadam is \$1,675.

The cost for each vehicle mile is given as 0.01 cent for pavement and 0.015 cent for macadam. For trucks, each ton-mile on pavement costs the public 0.01 cent, and on macadam, 0.015 cent. The cost per passenger mile is figured at 0.002 cent.

The figures take into consideration all kinds of depreciation, Nunn explained, not only to the pavement itself, but to the grade, cuts, fills, drainage, and interest charges on road bonds.

What the new regulations governing for-hire trucks and buses will be cannot yet be foretold, but it is said the truckmen offer no objection to the present regulation limiting the total load to 22,000 lbs., nor to the present speed regulations. A system of insurance for passengers and for granting licenses to bus lines on the basis of continuous and satisfactory service, eliminating the fly-by-night driver, are considered sure of incorporation in the new law.

### New Truck Line in St. Louis

ST. LOUIS, MO., Dec. 28.—A motor truck line employing three trucks has been put in operation by John Schlaefer, between St. Louis and Greenville, Ill., the round trip of 100 miles being made each day. The line follows a concrete highway recently completed and competes directly with the Pennsylvania Railroad, which serves the same district.

### Columbus Bus Lines Merge

COLUMBUS, OHIO, Dec. 22.—The merging of the East Broad Street and the Bryden Road bus lines has been completed by the Ohio Motor Bus Co., which was the owner of the Broad Street Line. The Bryden Road Line has been in operation for about 6 months with considerable success, but owing to the competition from the other line it was believed best to bring about the merger. The merger will give a 10-minute service to both streets and the routes will be changed to serve the people on both streets to a large degree. A fare of 5 cents is to be charged within the city limits and the fare will be 10 cents when the passenger is carried to Bexley, a suburb. I. C. Robinson is president.



## Would Connect Rail and Water Routes

### Plan of Port of New York Authority to Make Freight Handling Cheaper

NEW YORK CITY, Dec. 17—Freight handling in this city is expected to be cheaper than at any other port in the world when the plan of the Port of New York Authority starts functioning. This plan calls for the connecting of every water route with every railroad entering the port. The network of new traffic facilities extends from the Atlantic Highlands, N. J., to Piermont on the Hudson River, and from New Brunswick, N. J., to Westchester, N. Y.

Nineteen belt and connecting lines are proposed and they are intended to bring every part of New York City and every one of the more than 100 other municipalities in the port zone into immediate contact with the main stream of traffic circulation. The largest use of existing facilities will be made possible.

For instance, carloads or trainloads of freight coming from New England by the New Haven or New York Central and bound for the interior of the country would cross the river into Brooklyn, go from Brooklyn to New Jersey by tunnel across the Lower Bay and thence by any of the railroads terminating in New Jersey to their destination.

NEW YORK CITY, Dec. 21—The Port of New York Authority has unanimously adopted its report recently drawn for presentation to the Legislature and the Chairman was authorized to have the report printed immediately. It was pointed out that there would be no taxation for contemplated improvements in New York or New Jersey. It was the consensus of the meeting that each improvement would be approved and undertaken only when it could be shown to be economically profitable.

Several maps, showing proposed improvements, were approved by members of the Port Authority, including map of the proposed belt line with one or two changes due to operating difficulties, and another map showing the possibility of motor trunk lines to serve the metropolitan district. A third map shows large local improvements in the port district and the surrounding territory.

### Freight Run on Express Schedule to Compete with Trucks

DETROIT, Dec. 20—Michigan Central Railroad has inaugurated a system of fast daily local freight trains, running on express schedules, from Lansing to many points in Michigan, to compete with various motor truck lines centering there. It is predicted that if these experiments successfully cope with truck competition, the service will be extended.

## FIFTH AVENUE TO GET 5 CENT BUS LINE

NEW YORK, Dec. 19—Mayor Hylan has announced that the administration has completed its plans to establish a new bus line on Fifth Avenue and Riverside Drive, which will charge a five cent fare and operate in opposition to the Fifth Avenue Coach Co., which charges a ten cent fare.

### Price Changes

PONTIAC, Dec. 28.—General Motors Truck Co. has announced a reduction in the prices of its chassis effective Jan. 1, as follows:

	Old Price	New Price
Model K 41, 2 ton.	\$3,000	\$2,775
Model K 71, 3½ ton.	4,250	3,950
Model K 101, 5 ton.	4,650	4,350

Model K 16, which completes the line, remains at its former price, \$1,495, to which it was recently reduced.

ARDMORE, PA., Dec. 16.—The Autocar Co. has announced a reduction in prices on its standard truck, effective Jan. 3. The type F with a 97-in. wheelbase is reduced from \$2,300 to \$1,950 and type G with a 120-in. wheelbase from \$2,400 to \$2,050. The new 2-ton heavy duty truck with a 114-in. wheelbase is priced at \$2,950 and with a wheelbase of 138 in. at \$3,075. The new 5-ton heavy duty truck with a 120-in. wheelbase is listed at \$3,950 and with a 156-in. wheelbase at \$4,100.

ELYRIA, OHIO, Dec. 16.—The Garford Motor Truck Co. has reduced prices on its entire line of trucks, the cuts ranging from \$100 to \$340. The 1¼-ton chassis at \$1,990 is \$100 under previous price, and the 2-ton chassis is reduced \$340 from \$3,190, to \$2,750.

HENDERSON, N. C., Dec. 16.—The Corbitt Motor Truck Co. has announced the following prices on its 1922 models: 1-ton, \$1,400; 1½-ton, \$2,200; 2-ton, \$2,600; 2½-ton, \$3,000; 3-ton, \$3,200; 3½ and 4-ton, \$3,800, and 5-ton, \$4,500.

### New Transport Line for 1922

MT. PLEASANT, MICH., Dec. 27.—The Transport Truck Co. will begin the year with a new line of specialized trucks at reduced prices based on present costs. The company will feature six models, or two more than it has had previously. The line includes: Model 15, "Rapid Transport," 1-ton, equipped with pneumatic tires, at \$1,295; model 25, 1½-ton at \$1,495; model 35, 2-ton, \$1,185; model 55, 3-ton, \$2,385; model 60, 3½-ton, \$2,585; model 75, 5-ton, \$3,485.

The old prices on Transport models have been: 1-ton, \$1,395; 1½-ton, \$1,995; 2½-ton, \$2,785; 3½-ton, \$3,885.

The models 35, 55, 60 and 75 all are equipped with driveshaft brake, 4-speed transmission and electric lights, bumper, hub-odometer and Moto-Meter.

## Parts Stations Under One Head

### Automotive Parts Corp. Will Ultimately Have 50 Stations for Truck Units

CHICAGO, Dec. 21.—Officers of the Buda Company have incorporated as a subsidiary the Automotive Parts Corp. of America, which has already established twenty-nine service stations to handle Buda products, and the number of main stations ultimately will be increased to about fifty.

The main stations will be supplemented by a series of sub-stations which will carry only the fast moving parts and will depend upon the main stations for the larger and more expensive parts.

By means of these stations the Buda Company expects eventually to cover the whole country so that any part for a Buda engine can be obtained within a few hours. All stations will maintain a uniform list price.

Most of the Buda service stations now are carrying Torbenson axles and Fuller transmissions. These parts are handled under the same sales policy as that outlined by the Buda company.

Negotiations now are under way for servicing several other major units through this service station system.

It is proposed to adjust repair part prices from time to time so that they will be sold to the consuming public at only a fair margin of manufacturing profit.

### Buda Engine Service in St. Louis

ST. LOUIS, Mo., Dec. 16.—The Buda Engine Co., Harvey, Ill., will open a service station in St. Louis under the name of the Buda Engine Service Co. Service will cover eastern Missouri and southern Illinois.

### New 11½-Ton Sanford

SYRACUSE, N. Y., Dec. 17.—The Sanford Motor Truck Co. is bringing out a 1½-ton model equipped with electric starting and lighting, pneumatic cord tires and capable of sustaining a speed of 25 m.p.h. This will supplement its line of trucks which are made in capacities of 2½, 3½ and 5 tons.

### 2-Ton Hampden a Newcomer

HOLYOKE, MASS., Dec. 17.—The Hampden Motor Truck Corp. has been organized with \$1,000,000 capital to engage in the manufacture of two-ton trucks. A site of eight acres has been purchased in Willimansett, and plans have been drawn for a one-story brick factory, comprising two acres of floor space.

It is proposed to build only one model to sell for around \$2000, and to be ready for production to begin next spring. Though not built primarily for speed, the truck will be of somewhat lighter design than usual for a vehicle of the size.



## Duplex Brings Out a New Rail Car

**Has Speed of 45 M.P.H., Carries 32 Passengers and Weighs 10,000 Lbs.**

DETROIT, Dec. 17.—Duplex Truck Co., Lansing, exhibited at its stockholders' meeting this week a new gasoline-driven motor car designed for use by railroads for short hauls and branch line work. The rail car is in a way supplementary to the special bus model developed by the company which has been adopted in many communities during the year for street and road transportation.

President Harry M. Lee in introducing the new vehicle said its low operating cost would enable railroads to amplify their service on branch lines, and, probably, be instrumental in causing new lines and extensions to be built.

The car weighs about 10,000 lbs. and has a forward speed of 45 miles an hour and reverse speed of 25. The front end of the car is supported by a four-wheel truck with brakes on all four wheels and also on the rear wheels. The power drive is worm and ring gear. One-man operation is provided and there is seating capacity for thirty-two passengers. Separate batteries are used for starting and lighting.

Special design bodies will provide for cars acting as both passenger and freight carriers. Separate trailers for freight and baggage can also be used where volume is large enough to warrant, the speed of the car being little diminished by use of the trailer. It is also pointed out that the car could be used for emergency service on street railway lines.

## 80,000 Bushel Crop Hauled Under Severe Conditions

SPOKANE, WASH., Dec. 20.—A remarkable demonstration of the value of truck transportation to bridge emergencies has just been afforded in the Spokane district. By a splendidly organized effort, an 80,000-bushel crop of a fine commercial orchard was hauled across a mountain range to the railroad with economy and celerity.

At Hunters, on the Columbia River 75 miles northeast of Spokane, an orchard has been developed by a Spokane company and this season the apple trees came into commercial bearing for the first time. The nearest railroad to the south is at Davenport, 45 miles, and to the east at Springdale, 33 miles. The fruit was packed in bushel boxes so the problem resolved itself into transporting 4,000,000 lbs. by truck. The element of time entered into the problem inasmuch as the fruit had to be moved before frost set in to avoid loss from this cause.

The longer haul was the best from a topographical standpoint but road conditions were unfavorable. The shorter haul offered better roads but entailed climbing a range of mountains.

## MOTOR BUSES REPLACE HISTORIC RIGS IN BERKSHIRES

WESTFIELD, MASS., Dec. 26.—Again has replacement of the horse by the motor vehicle been emphasized here, in the retirement of Joseph Perras from the livery business and sale of his stables, one of the best known in western Massachusetts for more than half a century. But Mr. Perras is not to retire from active business. He has made plans to enter the motor bus field and to retain his mail-carrying contract. But the old familiar mail team has been replaced by a motor vehicle and the historic Perras rigs will be replaced by motor vehicles. The Perras stable equipment was bought by David Buckley, who is the last liveryman of prominence to retain stables in this territory. In bygone days the beauties of the Berkshires and summer visitors made the livery business popular. Commercial vehicles have replaced the livery rigs in taking tourists over the mountain routes.

The shorter, mountain haul was selected and a fleet of trucks was rapidly assembled. Gasoline stations were installed, water supplies arranged and repair shops erected for temporary use.

In a short time the hauling commenced and the arrangements were carried out practically without a hitch. In 31 days the huge quantity of apples was transported from orchard to railroad.

## Coming Events

1922

- Jan. 6-7, Columbus, Convention of Ohio Ass'n of Commercial Haulers, Hotel Chittenden.
- Jan. 19-25, Milwaukee, Wis., Truck Show, Auditorium.
- Jan. 21-26—San Francisco, Third Annual Automotive Equipment Exposition, Municipal Auditorium.
- Jan. 30-Feb. 2, Boston, 6th Annual Conference of International Delivery Ass'n at Copley Plaza Hotel.
- Feb. 3-10, Minneapolis, Minn., Fifteenth Annual Automobile Show, Minneapolis Auto Trade Ass'n., trucks and accessories. W. R. Wilmet, Mgr.
- Feb. 4-11, Youngstown, O., Truck Show.
- Feb. 6-9, Scranton, Pa., Truck Show, Armory. H. B. Andrews, Mgr.
- Feb. 12, Madison, Wis., Truck Show, Cartwell Bldg. F. W. Mowry, Mgr.
- Feb. 11-18, San Francisco, Cal., Sixth Pacific Automobile Show, Exposition Auditorium, trucks and accessories. G. A. Wahlgreen, Mgr.
- Feb. 20-25, Duluth, Minn., Seventh Annual Show of Duluth Auto Trade Ass'n, Duluth Armory Bldg., trucks and accessories.
- Feb. 27-28, Bethlehem, Pa., Truck Show, Armory. J. L. Elliott, Mgr.
- Feb. 27-March 4 (tentative date), Atlanta, Ga., Second Annual Great Southern Automobile Show, auspices of Atlanta Automobile Ass'n, Auditorium Armory. Trucks and accessories. Virgil W. Shepard, 305 Connolly Bldg., Show Mgr.
- March 11-18, Boston, Mass., Twentieth Annual Automobile Show of the Boston Automobile Dealers' Ass'n, Mechanics Bldg., trucks and accessories. Chester I. Campbell, Mgr., 5 Park Sq.

## Conference Held on Overloading

**Connecticut to Co-operate in Overcoming Existing Evil Detrimental to Roads**

HARTFORD, CONN., Dec. 16.—Representatives of the National Motor Vehicle Conference Committee conferred here yesterday with Motor Vehicle Commissioner Stoeckl on the State law designed to prevent the over-loading of motor trucks. It was made clear to them that the State officials would co-operate to the fullest extent with the automotive industry in its efforts to wipe out the over-loading evil.

The conference was the direct result of the ruling by the Connecticut authorities that trucks will be permitted to carry more than their rated load whenever their makers will certify that their operation will be entirely safe with the heavier load. This ruling was made at the earnest request of truck operators, but it is opposed by the National Motor Vehicle Conference Committee, which was represented at the conference by D. C. Fenner, its chairman, and F. W. Fenn, secretary of the National Automobile Chamber of Commerce. They do not believe trucks should carry more than their rated load.

It was explained by Stoeckl that if a manufacturer gave formal notice that a 3½-ton truck could safely carry a 5-ton load, the vehicle would be re-rated as of 5 ton capacity and would be taxed accordingly.

The Connecticut authorities contend that not only do over-loaded trucks seriously damage State highways, but also that they are a prolific cause of traffic accidents. It is asserted that the number of highway mishaps has decreased appreciably since rigid regulations against over-loading were adopted.

## Plan Big Merger of Body Plants

NEW YORK CITY, Dec. 28.—With a view of standardizing truck body specifications and also cutting body distribution and manufacturing costs to the truck makers, a large merger of national body building plants is now under way. All of these plants will be under the control of the United Automotive Body Co. with executive offices in Danville, Ill. This new company will be incorporated under Delaware laws.

Under this consolidation, branches in all of the truck manufacturing centers will take care of the distribution of the production department. Four of these branches are now in operation. The truck maker, under the plan, releases his chassis to the body branch in his particular district. The body is mounted and returned to the manufacturer. The latter then ships a complete job, saving the dealer the freight on the body, inasmuch as the combined weight of the body and chassis does not take up the minimum carload weight, which each dealer must pay, even on a car of bare chassis.

## Hints on

# How to Use the Specifications

## Many Ways in Which the Motor Truck Specifications Can Be Used to Advantage by Prospective Purchasers

**W**HEN the up-to-date truck owner wants specific information on any particular make or model of truck, he naturally turns to the truck specifications, as given in the Annual Specification Issue of THE COMMERCIAL VEHICLE.

These specifications are particularly valuable for purposes of comparison before a contemplated purchase of a truck is made. There are many details of equipment and design to be considered before purchasing a truck, both from the operating and from the legislative angle, to say nothing of the cost.

From the standpoint of operation, the fleet owner knows the particular kind of work for which he is purchasing the truck. And he knows the particular conditions of the roads, the loading facilities, the steepness of the grades met with in the territory in which it is to operate and the traffic conditions through which it may have to contend. Past experience or careful consideration will doubtless show him that one type of truck will be more suitable than another, for just those conditions.

In the same way local legislation must be carefully considered in relation to the size of the truck, its tires and its special equipment.

Finally, the cost is important, taken in relation with the wearing qualities of the vehicle he will buy. That is, if the truck is to be placed under a very great strain, running continuously fully loaded, a more expensive vehicle may prove a

considerable saving in the end. And vice versa.

Therefore, there are many ways in which the different models should be compared, in order to buy the truck best adapted to the particular requirements of the purchaser and to the locality in which the truck is to operate.

### Arranged Under Capacities

As it is possible that the average fleet owner and operator has not considered in how many ways the specifications can be of value to him, an attempt is made in this article to suggest as many as possible of these uses in connection with the local conditions and special requirements of the truck owner. The column heads, as they appear in the specifications later in this issue, are reproduced at the bottom of these two pages. They are numbered at the top, for greater convenience of reference in this article.

In previous annual issues of THE COMMERCIAL VEHICLE, the truck specifications have been arranged alphabetically under the maker's name.

But as the up-to-date fleet owner now knows within very close limits, the capacity of the truck which he wishes to purchase, the truck specifications have been arranged this year under capacities making it easy and convenient to turn to the capacity desired and then compare the various models offered.

Each set of specifications is accompanied by a diagram, showing in outline the design adhered to by the manufacturers in the majority of cases for that capacity and also listing the types of parts most favored by the manufacturers

for that capacity, both for 1921 and for 1922. This shows at a glance the trends in types of parts most generally used for the various capacities, sometimes indicating a distinct change from the previous year. From these, the fleet owner can see the prevailing type of construction in the capacity he wants to buy and can compare this with the various models offered.

Of course the truck owner will be largely influenced by the particular locality in which the truck is to work and the particular work which the truck is to do, so that the prevailing type of construction may be less suitable than some type less widely used, for his particular requirements. But in other cases, the prevailing type may be more valuable. And in any case, such knowledge will be suggestive of ideas as to the possibilities of new types of trucks for newer purposes, which the fleet owner may have been handling in other ways.

### Arranged in Eight Groups

For greater convenience, the models offered on the 1922 market have been arranged in eight groups, as follows:  $\frac{1}{2}$ -ton group,  $\frac{3}{4}$ -ton group, 1-ton group,  $1\frac{1}{2}$ -ton group, 2-ton group,  $2\frac{1}{2}$ -ton group,  $3\frac{1}{2}$ -ton group and 5-ton group.

There are other capacities, of course, but it has seemed more convenient, owing to the smaller number of the latter, to include them in one of the above groups. Thus the less than  $\frac{1}{2}$ -ton truck is included among the  $\frac{1}{2}$ -tonners. The  $1\frac{1}{4}$ -ton trucks are included in the  $1\frac{1}{2}$ -ton group. The 3-ton and 4-ton trucks are included among the  $3\frac{1}{2}$ -tonners, and

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
NAME AND MODEL	CHASSIS				TIRES				ENGINE										ELECTRICAL EQUIPMENT								
	Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. H. P.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Fuel Feed	Governor Make	Truck M. P. H.	IGNITION		START-ING		Extra Cost		
					Front	Rear	Front	Rear								Make	Size				Make	Size	Current Source	Make		Make	Extra Cost

Above are shown the different headings under which the motor truck specifications in this issue are arranged. These heads are reproduced here for convenience of reference.



ings, of course, represent the details given on the different models of trucks now on the market for nation-wide use. The numbers above each heading form a convenient index for reference in the article above.

# Buyer's Specifications of Nationally Dist

Details of the Various Chassis Models, Arranged Under Capacities

**1/2 - TON**

PRICE  
1922 - \$883  
1921 - \$1080.

ENGINE - BORE - STROKE  
1922 - 3 1/2 x 5  
1921 - 3 1/2 x 5  
S. A. E. HORSEPOWER  
1922 - 18.60  
1921 - 16.92

FRAME  
1922 - TRILLIUM STEEL  
1921 - TRUSS STEEL

FINAL DRIVE  
1922 - BEVEL  
1921 - BEVEL

GEARSET TYPE  
1922 - 1 SPEED  
1921 - 1 SPEED

WATER CIRCULATION  
1922 - THERMO - SYPHON  
1921 - THERMO - SYPHON

RADIATOR TYPE  
1922 - TUBULAR  
1921 - TUBULAR

TIRES - FRONT REAR  
1922 - PNEUMATIC PNEUMATIC  
1921 - PNEUMATIC PNEUMATIC

SIZE - FRONT - REAR  
1922 - 34 x 4 1/2 - 34 x 4 1/2  
1921 - 34 x 4 1/2 - 34 x 4 1/2

WHEELBASE  
1922 - 112 IN  
1921 - 109 IN

ELECTRIC SYSTEM  
1922 - STARTING LIGHTING & IGNITION - STOCK  
1921 - STARTING LIGHTING & IGNITION - STOCK

MAKE AND MODEL	CHASSIS				TIRES		ENGINE										ELECTRICAL EQUIPMENT				
	Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. H.p.	Radiator Type	Water Circulation	Oiling System	CARBURETER	Governor Make	Truck M. P. H.	IGNITION	STARTING	LIGHTING
Dodge Brothers	1 1/2	\$885		114	56	56	32x4p	32x4p	own.	4	3 1/2 x 5	24 22 pt	pt	pt	pt	Stow	1 vac	45	bat...	N.E...	N.E...
Dort	1 1/2	685	715	105 1/2	56	56	31x4p	31x4p	Lyc	4	3 1/2 x 5	19 6	pt	pt	pt	Stumg	1 vac	45	bat...	Conn...	Bos...
Seneca	M	1,020		108	56	56	30x4p	30x3 1/2 p	LeR	4	3 1/2 x 5	19 6	pt	pt	pt	Stumg	1 vac	45	bat...	Conn...	no...
Vim	29	1,050		108	56	56	31x4p	31x4p	own	4	3 1/2 x 5	15 64 ft	pt	pt	pt	Zenith	1 grv	33	bat...	W. Land	West
Vim	30	1,175		127	56	56	32x4 1/2 p	32x4 1/2 p	own	4	3 1/2 x 5	15 64 ft	pt	pt	pt	Zenith	1 grv	33	bat...	W. Land	West

**3/4 - TON**

PRICE  
1922 - \$1876.  
1921 - \$1729.

ENGINE - BORE - STROKE  
1922 - 3 1/2 x 5  
1921 - 3 1/2 x 5  
S. A. E. HORSEPOWER  
1922 - 18.61  
1921 - 16.91

FRAME  
1922 - PRESSED STEEL  
1921 - PRESSED STEEL

FINAL DRIVE  
1922 - BEVEL  
1921 - BEVEL

FUEL FEED  
1922 - VACUUM  
1921 - VACUUM

GEARSET TYPE  
1922 - 35 SPEED  
1921 - 35 SPEED

WATER CIRCULATION  
1922 - THERMO - SYPHON  
1921 - THERMO - SYPHON

RADIATOR TYPE  
1922 - CELLULAR  
1921 - CELLULAR

TIRES - FRONT REAR  
1922 - PNEUMATIC PNEUMATIC  
1921 - PNEUMATIC PNEUMATIC  
SIZE - FRONT - REAR  
1922 - 34 x 4 1/2 - 34 x 4 1/2  
1921 - 34 x 4 1/2 - 34 x 4 1/2

WHEELBASE  
1922 - 112 IN  
1921 - 109 IN

ELECTRIC SYSTEM  
1922 - STARTING LIGHTING & IGNITION - STOCK  
1921 - STARTING LIGHTING & IGNITION - STOCK  
CLUTCH TYPE  
1922 - DRY DISK  
1921 - DRY DISK

MAKE AND MODEL	CHASSIS				TIRES		ENGINE										ELECTRICAL EQUIPMENT				
	Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. H.p.	Radiator Type	Water Circulation	Oiling System	CARBURETER	Governor Make	Truck M. P. H.	IGNITION	STARTING	LIGHTING
Acme	G			130	56	56	35x5p	35x5p	Cont.	4	3 1/2 x 5	22.5	pt	pt	pt	Ray	1 vac	28	mag	Eism.	Au-L.
Chevrolet	G			120	56	56	31x4p	31x4p	own	4	3 1/2 x 5	24 03	pt	pt	pt	Zenith	1 grv	40	bat...	Remy	Au-L.
Commerce	T	1,450		127	56	56	34x4 1/2 p	34x4 1/2 p	Cont.	4	3 1/2 x 5	22.5	ft	pt	pt	Zenith	1 vac	40	mag	Eism.	Bijur
Clydesdale	18	1,890		136	56	56	34x5p	34x5p	Cont.	4	3 1/2 x 5	22.5	pt	pt	pt	Zenith	1 vac	33	mag	Eism.	Bijur
Denby	31	1,625		130	56	56	35x5p	35x5p	Cont.	4	3 1/2 x 5	19 6	ft	pt	pt	Stumg	1 grv	35	mag	Eism.	Remy
International	S	1,500		124	56	56	34x5p	34x5p	Lyc	4	3 1/2 x 5	19 6	ft	pt	pt	Ens	1 grv	25	bat...	Conn.	Au-L.



# Distributed Gasoline Trucks on 1922 Market

Diagrams Heading Each Capacity Group Compare 1921 and 1922 Units

## ABBREVIATIONS—Types of Construction

\* Tires optional  
 \*\* Pneumatics extra  
 \*\*\* Pneumatics and cushion tires extra  
 † Price includes body  
 but—storage battery  
 b-s—bevel spur  
 c—cone  
 cel—cellular  
 ch—chain  
 cir-spl—circulating splash  
 est-s—cast steel  
 en—enamel  
 d-d—dry disk  
 d-o—disk in oil  
 d-p—dry plate  
 flo—floating  
 1/2-flo—semi floating  
 ff—fin tube

grv—gravity  
 hol-erk—holow crankshaft  
 i—internal gear  
 mag—magneto  
 opt—optional  
 p—pneumatic  
 pl—plate  
 pres—pressure  
 p-stl—pressed steel  
 pt—plain tube  
 pu—pump  
 r-stl—rolled steel  
 sb—spiral bevel  
 stb—straight bevel  
 t—thermosyphon  
 vac—vacuum  
 wa—wood battery  
 wd—wood disk

## ABBREVIATIONS—Makers of Parts

A-K—Atwater Kent  
 Apo—Apeldo  
 Arc—Aitchfield  
 Au-L—Auto-Lite  
 AuW—Auto Wheel  
 B&B—Borg & Beck  
 Bij—Bijur  
 Bim—Bimel  
 Ben—Bendix  
 Ber—Berling  
 B-L—Brown Lape  
 Bos—Bosch  
 Bud—Buda  
 Car—Carter  
 CAS—CAS Products  
 Cen—Central  
 Cla—Clark  
 Col—Colander  
 Cont—Continental

Conn—Connecticut  
 Cot—Cotta  
 Cvt—Covert  
 Day—Dayton  
 Del—Deleo  
 Dela—Delaney  
 Det—Detroit  
 Dix—Dixie  
 Dtl—Duff  
 Dun—Dundore  
 Dup—Duplex  
 Dur—Durston  
 Dyn—Dyneto  
 Eat—Eaton  
 Eism—Eisenmann  
 Ens—Einsen  
 E & O—Eberly & Oris  
 Ful—Fuller

TRANSMISSION SYSTEM											STEERING GEAR		WHEELS		FRAME				MAKE AND MODEL
GEARSET		POWER TAKE-OFF			REAR AXLE														
Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive	Live Axle Type	Make	Model	Make	Type	Make	Material	Length From Cab To Rear	Maximum Body Length Recommended	
d-d...	own...		3	no	no	wa	103	4 166	sb	1/2 flo	wa		Kel	wa	own...	p-stl...	48	72	Dodge Brothers
d-d...	own...		3	no	no	wa	103	4 45	sb	1/2 flo	wa		Imperial	wa	own...	p-stl...			Dort
d-d...	War		3	no	no	wa	103	4 45	sb	1/2 flo	Gem...		Day...	wa	own...	p-stl...			Seneca
d-d...			3	no	no	wa	103	4 45	sb	1/2 flo	wa			wa	own...	p-stl...			Vim
d-d...			3	no	no	wa	103	4 45	sb	1/2 flo	wa			wa	own...	p-stl...			Vim

## ABBREVIATIONS—Makers of Parts—(Con)—

GBS—Golder, Belsnap & Swartz  
 GD—Gray & Davis  
 Gem—Gemmer  
 Grt—Grant-Less  
 Hay—Hayes  
 H&S—Hib Shaw  
 Her—Hercules  
 Hin—Hindley  
 Hoo—Hootes Bros  
 Hrt—Hartford  
 HS—Herschel Stroman  
 Ind—Industrial  
 Iron—Iron Mountain  
 Jac—Jacox  
 John—Johnson  
 Jon—Jones  
 Kel—Kelsey  
 King—Kingston  
 KW—KW Ignition Co.

Lav—Lavine  
 LeR—LeRoi  
 Lib—Liberty  
 L-N—Leece-Neville  
 Lye—Lyons  
 Mar—Marvel  
 Mas—Master  
 McC—McCormick  
 M&E—Meredith & Evans  
 Mid—Midwest  
 Mon—Monroe  
 Mue—Mueller  
 Mun—Muncie  
 MWC—Motor Wheel Corp.  
 N.E.—North East  
 Nor—Northway  
 P&B—Parish & Bingham  
 Phar—Pharmer  
 Pier—Pierce

Pru—Prudden  
 Ray—Rayfield  
 Rny—Roney  
 Ros—Ross  
 Roy—Royer  
 Ros—Ross  
 Russ—Russell  
 Sag—Saginaw Products Co.  
 Sal—Salisbury  
 Sav—Savage  
 Sch—Schwartz  
 Shb—Shelley  
 Shi—Shelton  
 Sim—Simplex  
 Smi—Smith  
 Spl—Splinter  
 Stan—Standard Parts Co.  
 Stan—Standard

STM—St. Mary  
 Strmbg—Stromberg  
 Stw—Stewart  
 Tea—Teagle  
 Thom—Thompson  
 Til—Tillotson  
 Tim—Timken  
 Tor—Torkelson  
 Uni—Universal  
 Ves—Vesta  
 Wal—Walker  
 Wan—Wayne  
 War—Warner Corp.  
 Weid—Weidner  
 Wes—Western Wheel Co.  
 Wis—Wisconsin  
 Woh—Wohlschlag  
 Wst—Winsthouse  
 Zen—Zenith

TRANSMISSION SYSTEM										STEERING GEAR		WHEELS		FRAME				MAKE AND MODEL	
GEARSET			POWER TAKE-OFF			REAR AXLE													
Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive	Live Axle Type	Make	Model	Make	Type	Make	Material	Length From Cab To Rear	Maximum Body Length Recommended	
d-d...	Cotta...	AAU	3	yes...	yes...	Timken...	6250	6.3	worm...	1/2 flo	Ros	RT	Bim...	opt	Smi...	p-stl...	110	120	Acme
cone...	own...	G...	3	no	no	Timken...	16	5 3-7	sb...	1/2 flo	own...	G	Hay...	opt	Smi...	p-stl...	81	100	Chesrolet
cone...	Detroit...		3	no	no	Timken...	16-B...	5.7	sb...	1/2 flo	own...	G	Hay...	opt	Smi...	p-stl...	81	100	Commerce
d-d...	B-L...	30	3	no	no	Timken...	6250	6.3	worm...	1/2 flo	Ros	RT	Smi...	opt	Smi...	p-stl...	110	120	Clydesdale
d-d...	Fuller...	S-1	3	yes...	yes...	Timken...	51020	6.3	worm...	1/2 flo	Ros	RT	MWC...	opt	Smi...	p-stl...	97	108	Denby
d-d...	M...		3	no	no	Timken...	51020	6.3	worm...	1/2 flo	Ros	RT	MWC...	opt	Smi...	p-stl...	97	108	International

# Buyer's Specifications of Nationally Distributed

MAKE AND MODEL	CHASSIS				TIRES		ENGINE										ELECTRICAL EQUIPMENT									
	Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase, inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. Hp.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Fuel Feed	Governor Make	Truck M. P. H.	IGNITION		START-ING		LIGHT-ING	
					Front	Rear	Front	Rear								Make	Size				Current Source	Make	Make	Extra Cost	Make	Extra Cost
Rainier Stoughton	R-21 C	1,990 1,240		125 131	56 56	56 56	35x5p 34x4 1/2 p	35x5p 34x4 1/2 p	Cont....	4 4	3 1/2 x 5 3 1/2 x 5	19.6 19.6	cel t	t t	cir-spl. cir-spl.	Zenith... Stmbg...	1 1	vac grv.	Mon...		mag bat	Opt...	Opt...	yes no	Opt...	yes no
White White	15 15-45	2,400 3,200		133 1/2 143 1/2	56 56	56 56	34x5p 34x5p	34x5p 34x5p	own....	4 4	3 3/4 x 5 1/2 4 1/4 x 5 3/4	22.5 29.0	cel cel	pu pu	he&cs. h	own....	1 1/2 1 1/2	grv vac	own...		mag mag			yes yes		yes yes

## 1-TON

**PRICE**  
1922 - \$1775  
1921 - \$1988.

**FRAME**  
1922 - PRESSED STEEL  
1921 - PRESSED STEEL

**FINAL DRIVE**  
1922 - WORM  
1921 - WORM

**GEARSET TYPE**  
1922 - 3 SPEEDS  
1921 - 3 SPEEDS

**FUEL FEED**  
1922 - GRAVITY  
1921 - GRAVITY

**CLUTCH TYPE**  
1922 - DRY DISK  
1921 - DRY DISK

**ELECTRIC SYSTEM**  
1922 - STARTING, LIGHTING & IGNITION - STOCK  
1921 - STARTING, LIGHTING & IGNITION - STOCK

**ENGINE - BORE - STROKE**  
1922 - 3 1/2" x 5"  
1921 - 3 1/2" x 5"

**S. A. E. HORSEPOWER**  
1922 - 24.5  
1921 - 21.08

**WATER CIRCULATION**  
1922 - PUMP  
1921 - THERMO-SYPHON

**RADIATOR TYPE**  
1922 - FINNED TUBE  
1921 - FINNED TUBE

**TIRES - FRONT - REAR**  
1922 - PNEUMATIC PNEUMATIC  
1921 - PNEUMATIC PNEUMATIC

**SIZE - FRONT - REAR**  
1922 - 34"x5" - 34"x5"  
1921 - 34"x5" - 34"x5"

**WHEELBASE**  
1922 - 131 IN  
1921 - 130 IN

MAKE AND MODEL	CHASSIS				TIRES		ENGINE										ELECTRICAL EQUIPMENT								
	Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. Hp.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Fuel Feed	Governor Make	Truck M.P.H.	IGNITION		START-ING		LIGHT-ING
					Front	Rear	Front	Rear								Make	Size				Current Source	Make	Make	Extra Cost	Make
Acme	H 1			130	56	56	34x3 1/2	34x5	Cont.	4	3 1/2 x 5	22.5	cel.	t	cir-spl.	Rav.	1	vac.	Dup	23	mag	Eism.	G&D	yes.	Eism.
Armleder	20 1			148	56	58	**34x4 1/2 p	**34x5	Bud.	4	3 1/2 x 5	22.5	5 ft.	pu	hol.erk.	Zenith.	1	vac.		19	mag	Bos.	West.	yes.	West.
Atlas	MD 1	1,185		130			32x4 1/2 p	32x4 1/2 p	Lyc.	4	3 1/2 x 5	19.6	ft.			Mar.	1	grv.			mag	A-K.	Bijur.	yes.	
Avery	1			129			34x5p	34x5p	own	4	3 1/2 x 5	14.4	cel.	t		Stmbg.	1	vac.	own	20		KW.	West.	no	
Bessemer	G 1	1,395		124			*34x3	*34x4	Cont	4	3 1/2 x 5	19.6	cel.	t	cir-spl.	Stmbg.	1	grv.			mag	Bos.	Bijur.	yes	Bijur.
Brockway	E 1			135	56	56	35x5p	35x5p	Bud	4	3 1/2 x 5	22.5	ft.		cir-spl.	Stmbg.	1	vac.			mag	Remy	Remy	no	Remy
Clydesdale	20 1	2,785		136	56	56	34x5p	34x5p	Cont	4	3 1/2 x 5	22.5	pt.	t	cir-spl.	Zenith.	1	vac.	own	40	mag	Eism.	Bijur.	no	Eism.
Corbitt	H-22 1	1,480		130	56	56	34x3 1/2	34x4	Cont	4	3 1/2 x 5	22.5	ft.	t	cir-spl.	Stmbg.	1	vac.	Sim.	18	mag	Eism.	Bijur.	yes	Bijur.
Day Elder	A 1	1,600		128	56	56	35x5p	35x5p	Cont.	4	3 1/2 x 5	22.5	ft.	t	cir-spl.	Zenith.	1	grv.		30	mag	Eism.	West.	\$ 50	Eism.
Defiance	G 1	1,695	1785	128	56	56	35x5p	35x5p	Hiel way	4	3 1/2 x 5	22.5	cel.	pu	hol.erk.	Stmbg.	1	vac.			mag	Eism.	Au-L.	no	Au-L.
Ford	TT 1	445		123	56	56	30x3 1/2 p	32x4 1/2 p	own...	4	3 1/2 x 4	22.5	ft.	t	cir-spl.	own.	1	grv.			mag	Own.	Own.	no	Own.
G. M. C.	K-16 1	1,495		132	55 1/2	55 1/2	34x5p	34x5p	own...	4	3 1/2 x 5	19.6	ft.	pu & t	hol.erk.	Mar.	1	grv.	own	25	mag	Eism.	Remy	no	Remy.
Gary	F 1	2,800		130	56	56	36x4	36x4	Bud.	4	3 1/2 x 5	22.5	ft.	t	hol.erk.	Mas.	1	vac.	McC.	20	mag	Eism.	N.E.	no	Opt.
Graham Bros	1	1,370		140	56	56	33x4 1/2 p	34x5p	Dodge	4	3 1/2 x 4	24.22	ft.	pu	cir-spl.	Stw.	1	vac.			mag	N.E.	N.E.	no	N.E.
Gramm Bernstein	10 1	1,365		129	56	56	33x5p	33x5p	Lyc	4	3 1/2 x 5	19.6	ft.	pu	cir-spl.	Stmbg.	1	grv.		50	mag	Conn.	Au-L.	no	Au-L.
Hahn	J-4 1			132	58	58	34x3 1/2	34x5	Cont...	4	3 1/2 x 5	22.5	ft.	pu	hol.erk.	Z&Str.	1	grv.	Phar.	22	mag	Deleo	Bos.	no	Deleo
International	21 1	1,750		115	56	56	34x5p	34x5p	own...	4	3 1/2 x 5	19.6	ft.	pu	cir-spl.	Ens.	1	grv.	own		mag	Bos.	Remy	no	N.E.
Kissel	Express 1			140	56	56	34 1/2 p	34x5p	own...	4	3 1/2 x 5	24.22	ft.	pu	cir-spl.	Stmbg.	1 1/2	vac.			mag	Bat.	Remy	no	Remy.
Kleiber	1	2,600		140	58	58	34x3 1/2	34x5	Cont...	4	3 1/2 x 5 1/2	27.23	ft.	pu	hol.erk.	Stmbg.	1	grv.	Sim.		mag	Bos.	Bos.	no	Bos.
Larrabee	X-2 1	1,925	2050	138	56	56	34x5p	34x5p	Cont	6	3 1/2 x 4 1/2	25.35	cel.	pu	hol.erk.	Zenith.	1	grv.		18	mag	Bos.	Bos.	yes.	Bos.
Menominee	HT 1	2,080		140	56	56	34x3 1/2	36x5	Wis...	4	3 1/2 x 5	22.5	ft.	pu	cir-spl.	Stmbg.	1	grv.			mag	Eism.	Bos.	yes.	Bos.
Napoleon	9 1	1,545	1615	133	56	56	35x5p	35x5p	Gray-B	4	3 1/2 x 5	19.6	ft.	t	hol-erk	Shb.	1	grv.		21	2 bat.	G&D	G&D	\$75	G&D
Nash	2018 1	1,895		130			34x4	34x4	own	4	3 1/2 x 5 1/2	22.5	ft.	pu	cir-spl.	Stmbg.	1	vac.	Dup	22	mag	Eism.	Au-L.	no	Au-L.
Patriot	Revere 1	1,500		128	56	56	35x5p	35x5p	Cont...	4	3 1/2 x 5	22.5	pt.	t	cir-spl.	Stmbg.	1 1/2	vac			mag	A-K.	Bijur.	no	Bijur.
Rainier	R-19 1	2,150		133		57	34x4	34x4	Cont	4	3 1/2 x 5	19.6	cel.	t		Zenith.	1	vac.	Mon	20	mag	Opt.	Opt.	yes.	Opt.
Signal	NF 1	2,227		132			34x4	36x5p	Cont	4	3 1/2 x 5	22.5	ft.	pu	cir-spl.	Stmbg.	1	grv.	Pier	25	mag	Lism.		yes.	
Stoughton	A 1	1,995		130			35x5p	35x5p	Wau.	4	3 1/2 x 5	22.5	ft.	pu	cir-spl.	Stmbg.	1	grv.	Wau		mag				Dyn



## Gasoline Trucks on 1922 Market—Continued

TRANSMISSION SYSTEM												STEERING GEAR		WHEELS		FRAME			MAKE AND MODEL	
CLUTCH		GEARSET		POWER TAKE-OFF		REAR AXLE					Make	Model	Make	Type	Make	Material	Length from Cab to Rear	Maximum Body Length Recommended		
Make	Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive									Live Axle Type	
d-d...	B-L.	25	3	no	no	Timken...	6250	6 75	worm...	1 1/2 flo...	Lav		Jon.	wa	Parish...	p-stl...	86 1/2		Rainier	R-21
d-d...			3	no	yes	Col.		5		sh	flo...			wa		p-stl...			Stoughton	C
pl	own		4	no	yes	own				sb	3 1/4 flo...	own	own	wa		p-stl...	85 3/8		White	15
pl	own			no	yes	own				sh	3 1/4 flo...	own	own	wa		p-stl...	85 3/8		White	15-45

## ABBREVIATIONS—Types of Construction

• Tires optional  
 ... Pneumatics extra  
 ... Pneumatics and cushions extra  
 ... Price includes body  
 but—storage battery  
 bs—bevel spur  
 c—cone  
 cel—cellular  
 ch—chain  
 cir-spl—circulating splash  
 cat-s—cast steel  
 cu—cushion  
 d-d—dry disk  
 d-o—disk in oil  
 d-p—dry plate  
 flo—floating  
 2 1/2 flo—semi floating  
 ft—in tube  
 gry—gravity  
 hol-erk—hollow crank shaft  
 i—internal gear  
 mag—magneto  
 opt—optional  
 pl—plate

p—pneumatic  
 press—pressure  
 p-stl—pressed steel  
 pt—plain tube  
 pu—pump  
 r-stl—rolled steel

sb—spiral bevel  
 stb—straight bevel  
 C—thermo siphon  
 vac—vacuum  
 wa—wood artillery  
 wd—wood disk

## Makers of Parts

A-K—Atwater-Kent  
 Apo—Apollo  
 Arc—Archibald  
 Au-L—Auto Late  
 AuW—Auto Wheel  
 B&B—Borg & Beck  
 Bij—Bijur  
 Rim—Rim-1  
 Ben—Bendix  
 Ber—Berling  
 B-L—Brown Lippe  
 Bos—Bosch  
 Bud—Buda  
 Car—Carrier  
 CAS—CAS Products  
 Cen—Central  
 Cla—Clark

Col—Columbia  
 Cont—Continental  
 Conn—Connecticut  
 Cot—Cotta  
 Cvt—Covart  
 Day—Dayton  
 Del—Delco  
 Dela—Delaney  
 Det—Detroit  
 Dix—Dixie  
 Dtl—Dethaff  
 Dun—Dundore  
 Dup—Duplex  
 Dur—Durston  
 Dyn—Dyneto  
 Eat—Eaton

Eism—Eisemann  
 Eng—Ensign  
 E & O—Eberly & Oris  
 Ful—Fuller  
 GBS—Golden, Bicknap & Swartz  
 G&D—Gray & Davis  
 Gem—Gemmer  
 G-L—Grant Lees  
 Gray-B—Gray Beall  
 Hay—Haynes  
 Hcls—Helo Shaw  
 Her—Hendrick  
 Hin—Hinkley  
 Hoo—Hooker Bros.  
 Hrt—Hartford  
 HS—Herschell Spelman  
 Ind—Industriette  
 Iron—Iron Mountain  
 Jac—Jacox  
 John—Johnson  
 Jon—Jones  
 Kel—Kelsay  
 King—Kingston  
 KW—KW Ignition Co.  
 Lav—Lavine  
 LeR—LeRoy  
 L-N—Lecoe Neville

Lyc—Lycoming  
 Mar—Marvel  
 Mas—Master  
 McC—McCanna  
 M&E—Merchant & Evans  
 Mid—Midwest  
 Mon—Monarch  
 Mue—Mueller  
 Mun—Munroe  
 MWC—Motor Wheel Corp.  
 NE—North East  
 Nor—Northway  
 P&B—Parish & Bingham  
 Phar—Pharo  
 Pier—Pierce  
 Pru—Prudden  
 Ray—Rayfield  
 Rny—Remy  
 Ros—Rose  
 Roy—Royer  
 Rus—Russell  
 Sag—Saginaw Products Co.  
 Sal—Salisbury  
 Sav—Savage  
 San—San Francisco  
 Sch—Schwartz

Shb—Shelton  
 Shl—Sheldon  
 Sim—Simplex  
 Smi—Smith  
 Spl—Splitdorf  
 Stan—Standard Parts Co.  
 Stan—Standard  
 StM—St. Mary  
 Stmbg—Stronberg  
 Stea—Stewart  
 Tea—Teagle  
 Thom—Thompson  
 Til—Tillotson  
 Tim—Timken  
 Tor—Torbensen  
 Uni—Universal  
 Ves—Vesta  
 Wal—Walker  
 Wan—Wayne  
 War—Warner Corp.  
 Wau—Waukesha  
 Weid—Weidely  
 Wes—Western Wheel Co.  
 Wis—Wisconsin  
 Woh—Wohlrab  
 West—Westinghouse  
 Zen—Zenith

TRANSMISSION SYSTEM											STEERING GEAR		WHEELS		FRAME			MAKE AND MODEL		
CLUTCH		GEARSET		POWER TAKE-OFF			REAR AXLE				Make	Model	Make	Type	Make	Material	Length from Cab to Rear			Maximum Body Length Recommended
Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive	Live Axle Type								Make	Model	
d-d	Cotta	AAU	3	yes	yes	Timken	6352	7 1-5	worm	1 flo	Ros	BU	Bim	wa	Smi	p-stl	110 3/8	120	Acme	B
d-d	Fuller	LTU	3	no	yes	Timken	6400	7 25	worm	flo	Ros	BU	StM	wa	StM	p-stl			Armedale	20
d-p	own		3	no		own			worm		CAS		E&O	wa	P&B	p-stl			Atlas	MD
d-d	Fuller	TU 3/4	3	no	no	Tor	A	7	1 1/2	flo	Ros	BU	own	wa	own	p-stl			Avery	
d-d	Warner	T38	3	no	yes	Col	51000	5 6-7	sb	1 1/4	Lav		Sch	wa	P&B	p-stl	98 1/4		Bessemer	E
d-d	B-L	35	3	no	no	Timken	6352	6 1-5	worm	1 1/2 flo	Ros	BU	own	wa	P&B	p-stl	95 1/4	96	Clydesdale	20
d-d	B-L		3	no	yes	Shl		5 5	worm	1 1/2 flo	Ros		Bim	wa	own	p-stl	108	114	Corbitt	H-22
d-d	Cvt	Mu	3	no	yes	Shl	W 1001	6 1/2	worm	1 1/2 flo	Gem	K	Jon	wa	Sav	p-stl	108	114	Day Elder	2
pl	GL	515	3	no	yes	Eat	1000	5 12	sb	1 1/2 flo	own		StM	wa	Detroit	p-stl	90	108	Defiance	G
d-o	own		3	no	no	own		7 1/4	worm	1 1/2 flo	own		own	wa	own	p-stl			Ford	TT
d-d	own		3	no	yes	own		6	stb	3 1/4 flo	own		Kel	wa	Smi	p-stl	100		G. M. C.	K-16
d-d	Fuller	TV 3/4	3	yes	yes	Timken		7 2	worm	1 1/2 flo	Ros	BU	own	wa	own	p-stl			Gary	F
d-d	Dodge		3	yes	yes	Sal	GG3R	6 28	sb	1 1/2 flo	Dodge		Kel, Stn	wa	Detroit	p-stl			Graham Bros	
pl	Warren	IA	3	yes	yes			5 1/4	sb	3 1/4 flo	Jac-Ros			wd	own	p-stl			Gamm Bernstein	10
d-d	B-L		3	no	no	Shl	1501	7	worm	1 1/2 flo	Ros	BU	Bm&Sch	wa	S&P&B	p-stl			Hahn	J-4
d-d	own		3	no	yes	own		7	1 1/2	flo	own		own	wa	P&B	p-stl	75	85	International	21
d-d	Warner	C-38	3	no	yes	Timken	6352	5 3/4	worm	1 1/2 flo	own	L-4A-6	StM	wa	Smi	p-stl	102	102	Kissel	Express
d-d	B-L	50	4	no	no	Timken	6460	7 1/2	worm	1 1/2 flo	Ros	BL	San	wa	own	p-stl	120	132	Kleiber	
d-d	B-L	30	3	no	yes	Sal	B	5 7 1/2	sb	3 1/4 flo	Ros	M	Ind	wa	own	p-stl	108	108	Larabee	X-2
d-d	Cotta	AAU	3	no	yes	Wis	800G	7 75	worm	1 1/2 flo	Ros	BU		wa	own	p-stl	102 1/2	108	Menominee	HT
d-d	Fuller	TU 3/4	3	no	yes			6	1 1/2	flo	Lav	1700	Roy	wa	own	p-stl	100 3/4	114	Napoleon	9
d-p	Detroit		3	no	yes	Clas		6 8	1 1/2	flo	Lav		Bim	wa	Smi	p-stl			Nash	2018
d-d	Cvt	MA	3	no	yes	Empire	B	6 2	worm	1 1/4	CAS			wa	Detroit	p-stl	93	96	Patriot	Revere
d-d	B-L	25	3	no	no	Shl	W-1501	7 8	worm	1 1/2 flo	Lav		Jon	wa	P&B	p-stl	96 1/2		Rainier	R-19
d-d	B-L	35	3	no	yes	Timken		7 20	worm	1 1/2 flo	Ros	BU	StM	wa	own	p-stl			Signal	NF
d-d	B-L	130	3	no	yes	Shl		6	worm	1 1/2 flo				wa	own	p-stl			Stoughton	A

# Buyer's Specifications of Nationally Distributed

MAKE AND MODEL	CHASSIS				TIRES		ENGINE										ELECTRICAL EQUIPMENT										
	Tons Capacity	Price	Stock Closed Cab	Wheelbase Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. Hp.	Radiator Type	Water Circulation	Oiling System	CARBU- RETER		Fuel Feed	Governor Make	Truck M. P. H.	IGNITION		START- ING		LIGHT- ING		
					Front	Rear	Front	Rear								Make	Size				Current Source	Make	Make	Extra Cost	Make	Extra Cost	
Triangle...	AA	1,385		115	56	56	34x4 1/2	34x4 1/2	H.S.	4	3 1/2 x 5	16 9	p	t	cr-spl	Stmblg	1	grv		40	bat	N.E.	N.E.	no	N.E.	no	
Vim	31	1,075		125	56	57	35x5	35x5	Her	4	3 1/2 x 5 1/2	21 5	ft	pu	cr-spl	Zenth.	1	grv		30	mag	West.	West.	no	West.	no	
Watson	1			128	56	56	34x5p	34x5p	Bud	4	3 1/2 x 5 1/2	21 0	ft	pu	cr-spl	Zenth.	1	grv		35	mag	Spl	Dyn.	no	Dyn.	no	
Wichita	K	2,300		144	56	57	36x4	36x4	Wau	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	grv	Wau	13 1/2	mag	Eism.	N.E.	yes	N.E.	ye	
Wilcox Trux	AA			130	56	56	36x4	36x4	Bud	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	grv	Sm	30	mag	West.	West.	no	West.	no	
Winther	751	1,795		115	56	56	34x4 1/2	35x5p	H. S.	4	3 1/2 x 5	13 6	ft	t	cr-spl	Stmblg	1	grv			30	mag	West.	West.	no	West.	no

1 1/2-TON

 PRICE  
 1922 - \$2435  
 1921 - \$2541

 ENGINE - BORE - STROKE  
 1922 - 3 1/2 x 5  
 1921 - 3 1/2 x 5 1/2

 S.A.E. HORSEPOWER  
 1922 - 22 50  
 1921 - 22 50

 FRAME  
 1922 - PRESSED STEEL  
 1921 - PRESSED STEEL

 FINAL DRIVE  
 1922 - WORM  
 1921 - WORM

 FUEL FEED  
 1922 - GRAVITY  
 1921 - GRAVITY

 GEARSET TYPE  
 1922 - 3 SPEEDS  
 1921 - 3 SPEEDS

 WATER CIRCULATION  
 1922 - CENTRIFUGAL  
 1921 - CENTRIFUGAL

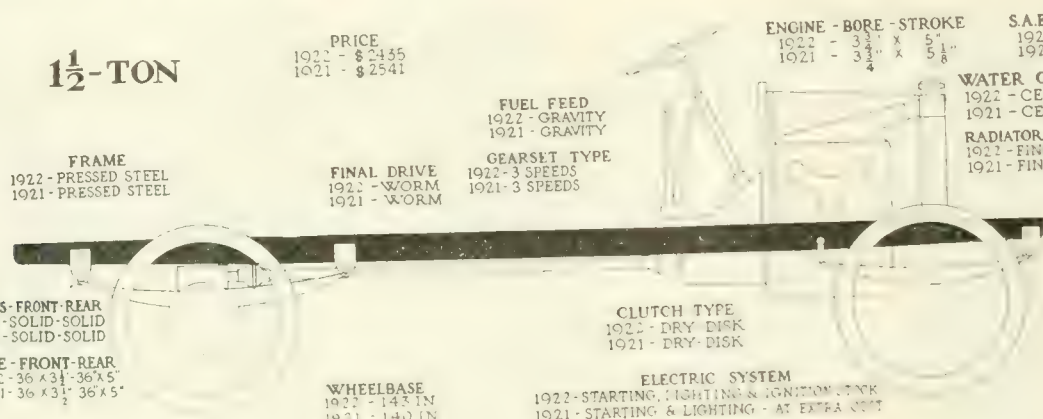
 RADIATOR TYPE  
 1922 - FINNED TUBE  
 1921 - FINNED TUBE

 TIRES - FRONT-REAR  
 1922 - SOLID-SOLID  
 1921 - SOLID-SOLID

 SIZE - FRONT-REAR  
 1922 - 36 x 34 - 36 x 5  
 1921 - 36 x 34 - 36 x 5

 WHEELBASE  
 1922 - 143 IN  
 1921 - 140 IN

 CLUTCH TYPE  
 1922 - DRY DISK  
 1921 - DRY DISK

 ELECTRIC SYSTEM  
 1922 - STARTING, LIGHTING & IGNITION, BATTERY  
 1921 - STARTING & LIGHTING - AT EXTRA COST


MAKE AND MODEL	CHASSIS				TIRES		ENGINE										ELECTRICAL EQUIPMENT										
	Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. Hp.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Fuel Feed	Governor Make	Truck M. P. H.	IGNITION		START-ING		LIC IN		
					Front	Rear	Front	Rear								Make	Size				Current Source	Make	Make	Extra Cost		Make	
Ace	F	11 1/2	\$2,295	144	56	58	34x4 1/2	34x5	Bud	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Zenth.	1	vac		Dap	18	mag	A-K	West.	no	West.	
Acme		11 1/2		141	58	58	34x4 1/2	34x5	Cont	4	3 1/2 x 5 1/2	25 5	ft	pu	cr-spl	Stmblg	1	vac			18 1/2	mag	West.	West.	no	West.	
Akron Multi	20	1 1/4	1,695	140 1/2	56	56 1/2	34x5p	34x5p	Hm	4	3 1/2 x 5 1/2	25 5	ft	pu	cr-spl	Stmblg	1	vac		Sim	20	mag	Bos	Bos	yes	Deleco	
Atterbury	20R	1 1/2	2,475	141	58	58	34x4 1/2	34x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Zenth.	1	vac		Sim	18	mag	Bos	Bos	yes	Bijur	
Available	H1 1/2	1 1/2	2,450	147	56	56	36x4 1/2	36x5	Hm	4	3 1/2 x 5 1/2	25 5	ft	pu	cr-spl	Stmblg	1	vac					mag	Bos	Bos	yes	Bijur
Bessemer	H-2	1 1/2	1,995	144	56	56	36x4 1/2	36x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac					mag	Bos	Bos	yes	Bijur
Clydesdale	42	1 1/2	2,475	146	56	58	36x4 1/2	36x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Zenth.	1	vac		own	18	mag	Bos	Bos	yes	Bijur	
Commerce	12	1 1/2	1,800	139	56	56	36x4 1/2	36x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Zenth.	1	vac		Sim	18	mag	Bos	Bos	yes	Bijur	
Corbitt	E-22	1 1/2	2,200	144	56	56	34x4 1/2	34x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac					mag	Bos	Bos	yes	Bijur
Defiance	D	1 1/2	2,095	140	56	56	36x4 1/2	36x5p	Hm	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac					mag	Bos	Bos	yes	Bijur
Denby	33	1 1/2	2,350	146	56	56	36x4 1/2	36x5p	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac					mag	Bos	Bos	yes	Bijur
Dependable	C	1 1/2	2,350	150	56	57 1/2	34x4	34x5	Bud	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Zenth.	1	vac		Mon	18	mag	Bos	Bos	yes	Bijur	
Diamond T	03 1/2	1 1/4	1,975	142	56	56	36x4 1/2	36x4	Hm	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac		Hm	28	mag	Bos	Bos	yes	Bos	
Diamond T	FS	1 1/2	2,575	141	56	56	36x4 1/2	36x5	Hm	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac		Hm	18	mag	Bos	Bos	yes	Bos	
Diamond T	T	1 1/2	2,250	154	56	56	36x4 1/2	36x5	Hm	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac		Hm	20	mag	Bos	Bos	yes	Bos	
Federal	SD	1 1/4	1,800	142	56	58	36x4 1/2	36x5p	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Zenth.	1	vac		Phar	25	mag	Bos	Bos	yes	Bos	
G. W. W.	1 1/4	1 1/4	1,670	142	56	56	36x4 1/2	36x5p	Wood	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac			38	mag	Bos	Bos	yes	Bos	
Gary	1	1 1/4	1,350	144	58	58	36x4 1/2	36x5	Bud	4	3 1/2 x 5 1/2	25 6	ft	pu	cr-spl	Zenth.	1	vac		McC	18	mag	Bos	Bos	yes	Bos	
Giant	15A	1 1/2	2,350	148	56	57	34x4 1/2	34x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac			15	mag	Bos	Bos	yes	Bos	
Graham Bros	1	1 1/2	1,475	140	56	56	34x4 1/2	34x5p	D	4	3 1/2 x 5 1/2	24 2	ft	pu	cr-spl	Stmblg	1	vac					mag	Bos	Bos	yes	Bos
Gramm-Bernstein	15	1 1/4	1,900	148	56	56	36x4 1/2	36x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac			25	mag	Bos	Bos	yes	Bos	
Indiana	12	1 1/2	1,800	141	56	56	36x4 1/2	36x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac		Wau	20	mag	Bos	Bos	yes	Bos	
International	31	1 1/2	1,850	139	56	56 1/2	36x4 1/2	36x4	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac		Wau	19 1/4	mag	Bos	Bos	yes	Bos	
Kalamazoo	G1	1 1/4	1,900	144	58	58	34x4 1/2	34x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac		Pier	20	mag	Bos	Bos	yes	Bos	
Kalamazoo	G2	1 1/2	2,300	144	58	58	36x4 1/2	36x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac		Pier	20	mag	Bos	Bos	yes	Bos	
Kissel...General Utility	1	1 1/2		142	56	57	36x4 1/2	36x5	Cont	4	3 1/2 x 5 1/2	22 5	ft	pu	cr-spl	Stmblg	1	vac		Pier	12	mag	Bos	Bos	yes	Bos	



## Gasoline Trucks on 1922 Market—Continued

TRANSMISSION SYSTEM											STEERING GEAR		WHEELS		FRAME				MAKE AND MODEL	
CLUTCH		GEARSET		POWER TAKE-OFF			REAR AXLE				Make	Model	Make	Type	Make	Material	Length from Cab to Rear	Maximum Body Length Recommended		
Make	Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive									Live Axle Type	
Fuller	d-d	Fuller	LTU-4	3	no	yes	Cl	AW	6.75	12flo.	Gem	L	Nor	wa	Mas	p-stl	94	108	Triangle	AA
Covt	d-d	Covt	MUC-3	3	no	yes	Cl		6.5	worm	12flo.	Ros	BU	wa	PAB	p-stl			Vim	31
B-L	d-d	B-L	30		no	yes				sh	12flo.			wa					Watson	
B-L	d-d	B-L	35	4	no	yes	sl	W 1500	7.8	worm	12flo.	Ros	BA	Bim	own	p-stl	127	138	Wichita	K
B-L	d-d	B-L	30		no	no	sl			worm	12flo.	Gem	1700	wa	Sm	p-stl	96	114	Wilcox Trux	AA
Warner	d-d	Warner	T-60	3	no	yes	for	OX-2L	6.6		12flo.	Liv	1700	MWC	own	p-stl	98	108	Winther	751

## ABBREVIATIONS—Types of Construction

* Tires optional	pl plate	Bos Bosch	Pol Polier	Lye Lyeonberg	Shb Shebler
** Pneumatics extra	p pneumatic	Bud Buda	GDS—Golden, Belknap & Swartz	Mar—Marvel	Shl—Sheldon
*** Pneumatics and cushions extra. † Price includes body	pres pressure	Car Carter	GAD Gray & Davis	Mar—Master	Sim—Simplex
bat storage battery	p-stl pressed steel	CAS CAS Products	Gem Gemmer	McC—McCaum	Sm—Smith
bs bevel spur cone	pt plate tube	Can Central	G-L Grant Lees	MAE—Merchant & Evans	Sp Spltdorf
cel cellular	pu putap	Ch Clark	Hay—Hayes	Mid—Midwest	Stan—Standard Parts Co.
ch chain	r-stl—rolled steel	Col Columbia	Hels—Hole Shaw	Mon—Monarch	Stan—Standard
cir-spl circulating splash	sb spiral bevel	Conn Connecticut	Her—Hercules	Muc—Muehler	STM—St. Mary
est—crust steel	stb straight bevel	Cont Continental	Hin—Hinkley	Mun—Munroe	Strmg Stromberg
cu—cushion	t thermosyphon	Cot Cora	Hoo—Hopkins Bros.	MWC—Motor Wheel Corp.	Stw Stewart
d-d—dry disk	vac vacuum	Cvt—Covest	Hrt—Hartford	N.E. North East	Ten Teagle
d-o—disk in oil	wa wood arbitrary	Day Dayton	HS—Herschel Spillman	N. Northern	Thom Thompson
d-p dry pack	wd wood disk	Del DeLo	Hyd—Hydraulic	PAB—Parish & Bingham	Til—Tillotson
flo floating	Makers of Parts	Dela DeLaney	Ind—Indestructible	Phar—Pharo	Tim—Timken
12 flo semi floating	A-k Atwater Kent	Det Detroit	IRM Iron Mountain	Pier—Pierce	Tor Torbensen
ft—fin tube	App Apollo	Dit—Ditweiler	Jac Jacob	Pru—Prudden	Uni—Universal
grv gravity	Are Archibald	Dix—Dixie	John—Johnson	Ray Rayfield	Ves—Vesta
hollow crank shaft	An-L Auto Lube	Dtl—Detlaft	Jon Jones	Rmy Remy	Wal—Walker
i internal gear	AnW—Auto Wheel	Dun—Dundore	Kei Keyes	Ros—Rose	War—Warner Corp.
mag magneto	BAB Borg & Beck	Dup—Duplex	King Kingston	Roy—Royer	Wau—Waukesha
opt optional	Bij—Bijur	Dyn—Dyneto	KW KW Ignition Co.	Ros—Ross	Weid—Weidely
	Bim—Bimel	Eat—Eaton	Lav Lavigne	Russ—Russell	West—Western Wheel Co.
	Ben—Bendix	Eism—Eiseman	LeR LeRoy	Sag Saginaw Products Co.	Wis—Wisconsin
	Bel—Belting	Eus—Eusman	Lb Liberty	Sal Salisbury	Woh Wohlrab
	B-L Brown Lipe	E & O—Eberly & Oris	L-N Loece Neville	Sav Savage	Wd Westinghouse
				Sch Schwartz	Zen—Zenith

TRANSMISSION SYSTEM											STEERING GEAR		WHEELS		FRAME			MAKE AND MODEL	
CLUTCH		GEARSET		POWER TAKE-OFF			REAR AXLE												
Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive	Live Axle Type	Make	Model	Make	Type	Make	Material	Length from Cab to Rear	Maximum Body Length Recommended	
d-d	Fuller...		3	no	yes	Timken...	6460	7	worm	12flo.	Ros...	BU...	Sch...	wa	own	p-stl	120	130	Ace
d-d	Cotta...	AA1	3	yes	yes	Timken...	6460	8	worm	12flo.	Ros...	BL...	Bim...	wa	own	p-stl	124	132	Acme
d-d	Warner...	138	3	no	no	Timken...	1000	7.5	sh	12flo.	Jac...	3A...	Bim...	wa	Hyd...	p-stl	102	108	Akron Multi
d-d	Fuller...	LTU	3	no	yes	Timken...	460	7.75	worm	12flo.	Ros...	BU...	Arc...	wa	Sav...	p-stl	122	142	Atterbury
d-d	B-L...	30	3	no	yes	Timken...	460	8	worm	12flo.	Ros...	BO...	StM...	wa	own	p-stl	120	120	Available
d-d	B-L...	35	3	no	no	Tor...	C	8	worm	12flo.	Ros...	BU...	Sch...	wa	own	p-stl	116		Bessemer
d-d	B-L...	30	3	no	no	Timken...	6460	7	worm	12flo.	Ros...	BU...		wa	PAB	p-stl	114	120	Clydesdale
d-d	B-L...	35	4	no	no	for	A	8	worm	12flo.	Jac...			wa	Detroit	p-stl			Commerce
d-d	B-L...	30-3	3	no	yes	sl		6	worm	12flo.	Ros...		Bim...	wa	own	p-stl			Corbett
pl	GL	515	3	no	yes	Tor...	A	7		own	Ros...	BU...	StM...	wa	Detroit	p-stl	119	144	Defiance
d-d	Fuller...	LTU-4	3	no	yes	Timken...	1-D	6.83		12flo.	Gem...	IM	MWC...	wa	Detroit	p-stl	119	141	Denby
d-d	Fuller...	LTU	3	no	yes	Was...	800H	8.25	worm	12flo.	Ros...	BU...	Bim...	wa	PAB	p-stl	121	132	Dependable
d-d	Cvt	MFC	4	no	yes	wa		4	worm	12flo.	Gem...	K	Sel...	wa	Sm	p-stl			Diamond T...
d-d	Cvt	MFC	4	no	yes	Was...	800H	8.1	worm	12flo.	Gem...	K	Sel...	wa	Sm	p-stl			Diamond T...
d-d	Cvt	MFC	4	no	yes	Timken...	4	7.4	worm	12flo.	Gem...	K	Sel...	wa	Sm	p-stl			Diamond T...
d-d	own...		3	no	no	Timken...	6460	7.2	worm	12flo.	Gem...	M	Detroit...	wa	Detroit	p-stl			Federal
d-d	Fuller...		4	no	yes	Cl		7		12flo.	Woh...			wa	own	p-stl			G. W. W.
d-d	Fuller...	H-3	3	yes	yes	Timken...		7.25	worm	12flo.	Ros...	BL		wa	own	p-stl			Gary
d-d	B-L...	M 30	3	no	no	sl	W 1500	7.8	worm	12flo.	Jac...		Wan...	wa	Detroit	p-stl			Grant
d-d	Dodge...		3	yes	yes	wa		6.28		12flo.	Dodge...		Kel-St.	wa	Detroit	p-stl			Graham Bros.
d-d	Fuller...		3	no	yes	sl	1-D...	7.8		12flo.	Ros...	HI	Bim...	wa	own	p-stl			Gramm-Bernstein
pl	B-L...		3	no	yes	sl	W 1500	7.8		12flo.	Woh...		Bim...	wa	own	p-stl	108	108	Indiana
d-d	own...		3	no	yes	wa		5		12flo.	own		own...	wa	PAB	p-stl	100	122	International
d-d	Fuller...	G7	4	no	yes	Was...	800H	8.5	worm	12flo.	Ros...	BL	Bim...	wa	own	p-stl	124	144	Kalamazoo
d-d	Fuller...	G7	4	no	yes	Was...	800H	8.5	worm	12flo.	Ros...	BL	Bim...	wa	own	p-stl	124	144	Kalamazoo
d-d	Warner...	G-28	4	no	yes	sl	W 1500	7.8	worm	12flo.	Ros...	BL	Pru...	wa	own	p-stl	120	120	Kissel...General Utility

# Buyer's Specifications of Nationally Distributed

MAKE AND MODEL	CHASSIS				TIRES		ENGINE										ELECTRICAL EQUIPMENT									
	Tons Capacity Price		Stock Closed Cab Standard Wheelbase Inches		TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. Hp.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Fuel Feed	Governor Make	Truck M. P. H.	IGNITION		START-ING		LIGHT-ING	
					Front	Rear	Front	Rear								Make	Size				Current Source	Make	Make	Extra Cost	Make	Extra Cost
Kleiber	D	11	1,100	147	58	58	36x31	600	Cont	4	4x5 1/4	27 2 ft	pu	hol erk	Stmzg	14 grv	Sim.	18	mag	Spl	Bos	no	West. Bos.	no	West. Bos.	
Koehler	J-4	11	1,885	147	56	58	34x31	445	Cont	4	4x5 1/4	22 5 ft	pu	hol erk	Zenth	1 grv	Sim.	18-22	mag	Spl	Bos	no	Bos.	no	Bos.	
Larrabee	J-4	11	2,400	148	56	58	34x31	445	Cont	4	4x5 1/4	22 5 ft	pu	hol erk	Zenth	1 grv	Sim.	18-22	mag	Spl	Bos	no	Bos.	no	Bos.	
Maccar	L-2	11	2,700	150	58	58	36x4	600	Cont	4	4x5 1/4	27 2 ft	pu	hol erk	Zenth	14 grv	Mue	19	mag	Eism.	L-N	no	Bos.	no	Bos.	
Mack	AB Chain	11	3,000	144	58 1/2	62 1/2	34x4	600 1/2	own	4	4x5 1/4	25 6 cel	pu	hol erk	Spl	14 grv	Mue	19.54	mag	Eism.	L-N	\$250	L-N.	\$17	L-N.	
Mack	AB	11	3,450	144	58 1/2	60 1/2	34x4	600 1/2	own	4	4x5 1/4	25 6 cel	pu	hol erk	Spl	14 grv	Mue	19.54	mag	Eism.	L-N	\$250	L-N.	\$17	L-N.	
Master	JW	11	2,400	142	56	56	34x31	445	Cont	4	4x5 1/4	27 2 ft	pu	hol erk	own	14 grv	McC	15	mag	Spl	Au-L	yes	Au-L	yes	Au-L	
Maxwell	JW	11	1,922	124	56	56	34x31	445	own	4	4x5 1/4	21 03 ft	pu	hol erk	Fil.	14 grv	Phar	24	mag	Spl	Au-L	yes	Au-L	yes	Au-L	
Moline	10	11	1,985	130	56	56	34x31	445	own	4	4x5 1/4	19 6 ft	pu	hol erk	Fil.	14 grv	Phar	24	mag	Spl	Au-L	yes	Au-L	yes	Au-L	
Napoleon	B30	11	1,835	145	56	56	34x31	445	Cont	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Noble	B30	11	2,100	156	56	56	34x31	445	Cont	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Old Hickory	W	11	2,175	145	56	56	34x31	445	Cont	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Oneida	B	11	2,825	144	56	56	34x31	445	Cont	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Mon	18	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Paige	52-19	11	2,880	140	56	56	34x31	445	Cont	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Mon	18	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Rainier	R-16	11	2,400	147	56	56	34x31	445	Cont	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Mon	18	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Reo	F 2-14	11	1,245	128	56	56	34x31	445	own	4	4x5 1/4	27 2 ft	pu	hol erk	Spl	14 grv	Pier	18	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Schwartz	A	11	1,685	130	56	56	34x31	445	own	4	4x5 1/4	19 6 cel	pu	hol erk	Spl	14 grv	Pier	18	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Selden	1 2-A	11	2,360	137	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	18	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Service	15-13	11	1,840	132	56	56	34x31	445	own	4	4x5 1/4	21 03 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Signal	H	11	2,632	144	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Standard	IK	11	1,808	134	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Sterling	11	11	2,855	142	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Stoughton	B	11	2,350	140	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Tower	J	11	2,900	142	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Traffic	Speedboy	11	1,595	128	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Triangle	A	11	2,350	144	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
United	AT	11	1,975	145	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
United States	N	11	1,975	144	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Veteran	E	11	3,500	186	58	58	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Wichita	L	11	2,600	144	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Wilcox Trux	B	11	2,600	145	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Winther	39	11	2,450	140	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	
Winther	430	11	2,850	132	56	56	34x31	445	own	4	4x5 1/4	22 5 ft	pu	hol erk	Spl	14 grv	Pier	15	mag	G&D.	G&D.	yes	G&D.	no	G&D.	

S. A. E. HORSEPOWER ENGINE BORE STROKE  
 1922 - 25.6 1922 - 4 5 1/4  
 1921 - 27.2 1921 - 4 5 1/4

WATER CIRCULATION  
 1922 - PUMP  
 1921 - PUMP

RADIATOR TYPE  
 1922 - PINNED TUBE  
 1921 - PINNED TUBE

PRICE  
 1922 - \$2941.  
 1921 - \$3063

GEARSET TYPE  
 1922 - 4 SPEEDS  
 1921 - 4 SPEEDS

FUEL FEED  
 1922 - GRAVITY  
 1921 - GRAVITY

FINAL DRIVE  
 1922 - 12" AM  
 1921 - 12" AM

FRAME  
 1922 - PREPARED STEEL  
 1921 - PREPARED STEEL

CLUTCH TYPE  
 1922 - DRY DISK  
 1921 - DRY DISK

WHEELBASE  
 1922 - 144"  
 1921 - 142"

ELECTRIC SYSTEM  
 1922 - STARTING AND LIGHTING BY ELECTRICITY  
 1921 - STARTING AND LIGHTING BY ELECTRICITY

2-TON

TIRES - FRONT-REAR  
 1922 - SOLID-SOLID  
 1921 - SOLID-SOLID  
 SIZE - FRONT-REAR  
 1922 - 36x4 36x7  
 1921 - 36x4 36x7

MAKE AND MODEL	CHASSIS				TIRES		ENGINE										ELECTRICAL EQUIPMENT								
	Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. Hp.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Fuel Feed	Governor Make	Truck M.P.H.	IGNITION		START-ING		LIC
					Front	Rear	Front	Rear								Make	Size				Make	Size	Current Source	Make	
Autocar . . . . .	21-F 13-2	\$1,050		120	58	44	4x	OWN . . . . .	4	18 10 ft				circ-spl	Stmzg . . . . .		RTV . . . . .								
Autocar . . . . .	21-G 13-2			120	58	44	4x	OWN . . . . .	4	18 10 ft						Stmzg . . . . .		RTV . . . . .	Phar						
Autocar . . . . .	27-H			114		34x5	4x	OWN . . . . .	4							Stmzg . . . . .		RTV . . . . .							



## Gasoline Trucks on 1922 Market—Continued

TRANSMISSION SYSTEM											STEERING GEAR		WHEELS		FRAME			MAKE AND MODEL			
CLUTCH		GEARSET		POWER TAKE-OFF			REAR AXLE														
Make	Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive	Live Axle Type	Make	Model	Make	Type	Make	Material	Length from Cab to Rear	Maximum Body Length Recommended	Make	Model
B-L...	d-d.	B-L...	30	4	no	no	Timken.	6460	7 1/4	worm...	1/2 flo.	Ros.	BL...	Sha	ests	own...	r-stl.	132	144	Kleiber...	
Mech.	d-d.	Mech.	LW.	4	no	no	own...	own...	7 1/4	worm...	1/2 flo.	Lav.	Lav.	Jon.	wa	own...	p-stl.	108	120	Koehler...	
B-L...	d-d.	B-L...	30	3	no	yes	Shl	W-1501	7 6/6	worm...	1/2 flo.	Gem.	K	Hoo.	wa	Sav...	p-stl.	120	138	Larrabee...	
B-L...	d-d.	B-L...	35	4	no	yes	Timken.	6460	8 1/4	worm...	1/2 flo.	Ros.	BL...	Day...	ests	P&B...	p-stl.	120	138	Maccar...	
own...	d-d.	own...	AB	4	yes...	own...	own...	AB	6 9/9	ch...	1/2 flo.	own...	AB	opt	wa	own...	p-stl.	120	138	Mack...	AB Ch
own...	d-d.	own...	AB	4	yes...	own...	own...	ABDR	7 6/0	ch...	1/2 flo.	own...	AB	opt	wa	own...	p-stl.	120	138	Mack...	
Fuller...	d-d.	Fuller...	LTU8	3	no	yes	Timken.	6460	7 7/5	worm...	1/2 flo.	Ros.	BU...	Pru...	wa	P&B...	p-stl.	126	138	Master...	
own...	d-d.	own	own	3	no	yes	own...	own...	7 2/5	worm...	1/2 flo.	Ros.	BU...	MWC...	wa	Hyd	p-stl.	126	138	Max well...	
B&B...	d-d.	own	own	3	no	yes	Tor.	own...	7 2/5	worm...	1/2 flo.	Ros.	BU...	own...	own...	own...	p-stl.	126	138	Moline...	
Fuller...	d-d.	Fuller...	TU	3	no	yes	Mad	W103	7 5/5	worm...	1/2 flo.	Lav.	1700...	Roy...	wa	own...	r-stl.	126	138	Napoleon...	
Fuller...	d-d.	Fuller...	LTU5	3	no	yes	Shl	Timken.	8 1/4	worm...	1/2 flo.	Lav.	1700...	Bim...	wa	own...	p-stl.	126	138	Noble...	
B&B...	d-pl.	GRL...	GRL	3	no	yes	Timken.	W103	7 7/5	worm...	1/2 flo.	Lav.	1700...	Sta.	wa	own...	p-stl.	126	138	Old Hickory...	
Fuller...	d-d.	Fuller...	LT-1	3	no	yes	Wis.	800-HA	7 7/5	worm...	1/2 flo.	Ros.	BU...	StM.	wa	own...	p-stl.	126	138	Oneida...	
B-L...	d-d.	B-L...	35	4	no	yes	Timken.	6460	7 7/5	worm...	1/2 flo.	Ros.	BU...	Hyd	wa	own...	p-stl.	126	138	Paige...	
B-L...	d-d.	B-L...	30	3	no	no	Shl	W-1501	7 8/8	worm...	1/2 flo.	Lav.	Jon.	wa	Parish	p-stl.	110	120	Rainier...	52-R	
own...	d-d.	own...	SL-1	3	no	no	own	own	4 7/8	sb...	1/2 flo.	own...	BU...	Pru...	wa	own...	p-stl.	104	108	Reo...	
Fuller...	d-d.	Fuller...	SL-1	3	no	yes	Lar	1000	6 14	sb...	1/2 flo.	Ros.	BU...	Sch...	wa	P&B...	p-stl.	114	120	Schwartz...	
B-L...	d-d.	B-L...	30	3	no	yes	Timken.	1000	7 7/5	worm...	1/2 flo.	Ros.	BU...	Arc.	wa	own...	p-stl.	114	120	Selden...	12
B-L...	d-d.	B-L...	35	3	no	yes	Timken.	6352	7 2/2	worm...	1/2 flo.	Ros.	BU...	Detroit.	p-stl	Sav...	r-stl.	120	120	Service...	
B-L...	d-d.	B-L...	35	3	no	yes	Timken.	6460	7 0	worm...	1/2 flo.	Ros.	BU...	StM.	wa	own...	p-stl.	120	120	Signal...	
Fuller...	d-d.	Fuller...	LTU5	3	no	no	Shl	Timken.	7 8	worm...	1/2 flo.	Ros.	BU...	Pru...	wa	Smi.	p-stl.	126	138	Sterling...	
					no	no	Timken.	own...	7 2/5	worm...	1/2 flo.	Ros.	BU...	own...	own...	own...	p-stl.	126	138	Stoughton...	
Cvt...	d-d.	Cvt...	MNT	3	no	yes	Ros.	1-0	6 15	worm...	1/2 flo.	own...	BU...	Day...	wd.	own...	r-stl.	120	126	Tower...	
Fuller...	d-d.	Fuller...	LTU5	3	no	yes	Ch	1-0	7 2/5	worm...	1/2 flo.	Gem.	K...	N or Ry.	wa	Mason.	r-stl.	120	126	Traffic...	Speedb
Fuller...	d-d.	Fuller...	LTU5	3	no	yes	Shl	1-0	7 2/5	worm...	1/2 flo.	Jac.	K...	Sch...	wa	own...	p-stl.	120	126	Triangle...	
Fuller...	d-d.	Fuller...	LTU5	3	no	yes	Ch	1-0	7 6	worm...	1/2 flo.	Lav.	1700	Sch...	wa	own...	p-stl.	120	126	United...	A
B&B...	d-d.	Cotta...	AAU	3	yes	no	Shl.	W-1501	6 5	worm...	1/2 flo.	Ros.	BL	Sha	ests	own...	r-stl.	127	138	United States...	
own...	d-d.	B-L...	35	4	no	yes	Shl.	W-103	8 6	worm...	1/2 flo.	Ros.	BA.	Bim...	wa	own...	p-stl.	132	144	Veteran...	
M&E...	d-d.	own	Q.	4	no	yes	Wai	W-103	8 6	worm...	1/2 flo.	own...	BA.	Bim...	ests.	Smi.	p-stl.	132	144	Wichita...	
Fuller...	d-d.	Fuller...	LT14	3	no	yes	Medway.	30	7	worm...	1/2 flo.	Lav.	1700	Medway	ests.	own...	r-stl.	117	120	Wilcox Trux...	Bl
Fuller...	d-d.	Fuller...	LT14	3	no	yes	Medway.	30	7	worm...	1/2 flo.	Lav.	1700	Medway	ests.	own...	r-stl.	120	120	Winther...	3

## ABBREVIATIONS—Types of Construction

• Tires optional	opt optional
• Pneumatics extra	pl plate
• Pneumatics and cushions extra	p-pneumatic
• Price includes body	pres pressure
bat storage battery	p-stl—pressed steel
bx bevel spur	pt plan tube
c cone	pu pump
cel cellular	r-stl rolled steel
ch chain	sb spiral bevel
cir-spl circulating splash	sth straight bevel
est-s cast steel	t thermopneumatic
cu cushion	vac vacuum
d-d dry disk	wa wood artillery
d-o disk in oil	wd wood disk
d-pl dry plate	
flo floating	
1/2 flo semi-floating	
ft fin tube	
grv gravity	
hol-erk hollow crank-shaft	
1 internal gear	
mag magnet	

## Makers of Parts

A-K—Atwater-Kent
Apo—Apollo
Arc—Archibald
Aut—Auto-Lite
AW—Auto Wheel
B&B—Borg & Beck
Bij—Bijer
Bim—Bimel

Ben—Benz
Ber—Berling
B-L—Brown Lips
Box—Boxh
Bud—Buda
Car—Carter
CAS—CAS Products
Can—Central
Ch—Clark
Col—Columbia
Cont—Continental
Conn—Connecticut
Cot—Cotta
Cvt—Covert
Day—Dayton
Del—DeLo
DeLa—Delaney
Det—Detroit
Dit—Dittler
Dix—Dixie
Drl—Dreliff
Dun—Dundore
Dup—Duplex
Dur—Durston
Dyn—Dyna
Eat—Eaton
Eism—Eisenman

Ens—Ensign
E & O—Eberly & Oris
Ful—Fulmer
GBS—Golden, Belknap & Swartz
G&D—Gray & Davis
Gem—Gemmer
GR—Grant-Lee
Hay—Haynes
Hels—Hels Shaw
Her—Hercules
Hin—Hinkley
Hoo—Hookey Bros.
Hut—Hurtford
HS—Herschell Spillman
Hyd—Hydraulic
Ind—Indestructible
IRM—Iron Mountain
Jac—Jacox
John—Johnson
Jon—Jones
Kel—Kelley
King—Kingston
KW—KW Ignition Co.
Lav—Lavine
LeR—Le Roi
Lib—Liberty
L-N—Leone Neville

Lye—Lyeomg
Mar—Marvel
Max—Master
McC—McCauna
McC—Merchant & Evans
Mech—Mechanics
Mid—Midwest
Mon—Monarch
Mue—Mueller
Mun—Muncie
MWC—Motor Wheel Corp.
NE—North East
Nor—Northway
P&B—Parish & Bingham
Phar—Pharo
Pier—Pierce
Pru—Prudden
Ray—Rayfield
Rmy—Remy
Ros—Rose
Roy—Royer
Russ—Russell
Sag—Saginaw Products Co.
Sal—Salisbury
Sav—Savage
Sch—Schwartz

Shb—Shobler
Shl—Sheldon
Sim—Simplex
Smi—Smith
Spl—Splendor
Stan—Standard Parts Co.
Stan—Standard
STM—St. Mary
Stmbg—Stromberg
Stw—Stewart
Tea—Teagle
Thom—Thompson
Til—Tillotson
Tim—Timken
Tor—Torben
Uni—Universal
Ves—Vesta
Wal—Walker
Wan—Wayne
War—Warner Corp.
Wau—Waukesha
Weid—Weidly
Wes—Western Wheel Co.
Wis—Wisconsin
Woh—Wohlbach
West—Westinghouse
Zen—Zenith

TRANSMISSION SYSTEM												STEERING GEAR		WHEELS		FRAME			MAKE AND MODEL	
CLUTCH		GEARSET		POWER TAKE-OFF		REAR AXLE														
Make	Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive	Live Axle Type	Make	Model	Make	Type	Make	Material	Length from Cab to Rear	Maximum Body Length Recommended	
pl	own			3	no	yes	own		8 3	bs	flo	Ros	BL		wa		p-stl	91	Autocar	21-F
pl	own			3	no	yes	own		8 3	bs	flo	Ros	BL		wa		p-stl	114	Autocar	21-G
pl	own			4	no	yes	own		6 43	1	flo	Ros	BL		wa		p-stl	131 1/2	Autocar	27-H

# Buyer's Specifications of Nationally Distributed

MAKE AND MODEL	CHASSIS				TIRES		ENGINE										ELECTRICAL EQUIPMENT								
	Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. Hp.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Governor Make	Truck M. P. H.	IGNITION		START-ING		LIGHT-ING	
					Front	Rear	Front	Rear								Make	Size			Fuel Feed	Current Source	Make	Make	Extra Cost	Make
Autocar	27-K	3,075		138	60	60	34x5	34x7	own...	4	4x5 1/2	25.6	ft	pu	cir-spl.	Stmbg.	1 1/4	grv.	Phar.	19	mag	Eism.	N.E.	yes	N.E.
Brockway	S4			140	58	58	36x5	36x5	Cont...	4	4x5 1/2	22.5	ft	pu	hol. crk.	Stmbg.	1 1/4	vac	Phar.	22	mag	Eism.	N.E.	yes	N.E.
Brockway	SK			145	58	58	36x4	36x6	Cont...	4	4x5 1/2	27.2	ft	pu	hol. crk.	Stmbg.	1 1/4	vac	Phar.	22	mag	Eism.	N.E.	yes	N.E.
Commerce	16			137	56	56	35x5p	36x6p	Cont...	4	4x5 1/2	22.5	ft	t	cir-spl.	Zenith.	1 1/4	vac		30	mag	Eism.	Bijur.	no	Bijur.
Corbitt	C22	2,600		148	58	60	36x3 1/2	36x7	Cont...	4	4x5 1/2	27.2	ft	pu	cir-spl.	Stmbg.	1 1/4	vac	Sim.	16	mag	Eism.	West.	yes	Eism.
Day-Elder	B	2,000		144	56	57	34x3 1/2	34x5	Cont...	4	4x5 1/2	22.5	ft	pu	cir-spl.	Zenith.	1 1/4	grv.		15	mag	Eism.	West.	yes	Eism.
Defiance	E	2,275		140	56	56	35x5p	38x7p	Highway	4	4x5 1/2	22.5	ft	pu	hol. crk.	Stmbg.	1 1/4	vac		22.5	mag	Eism.	Au-L.	yes	Au-L.
Denby	134	2,600		144	57	61 1/2	36x3 1/2	36x6	Cont...	4	4x5 1/2	22.5	ft	pu	cir-spl.	Stmbg.	1 1/4	grv.	Mon.	16	mag	Eism.	Bos.	yes	Bos.
Diamond T.	U	2,650		160	58 1/2	58 1/2	36x4	36x7	Hin	4	4x5 1/2	25.6	ft	pu	hol. crk.	Stmbg.	1 1/4	vac	Hin	16	mag	Eism.	BijorW.	yes	Bos.
Duplex	A	2,775		145	55 1/2	57	35x5p	38x7p	Hin...	4	4x5 1/2	25.6	ft	pu	cir-spl.	Stmbg.	1 1/4	grv		35	bat..	West.	West.	no	West.
Duty				134	56	56			Gray-B.	4	4x5 1/2	19.6	ft	t	cir-spl.	Zenith.	1 1/4	grv.		34.6	mag	Eism.	West.	yes	West.
Federal	TE	2,175		144	57	58	36x3 1/2	36x5	Cont...	4	4x5 1/2	27.2	ft	pu	cir-spl.	Zenith.	1 1/4	grv.	Phar.	15	mag	Eism.	Au-L.	yes	Au-L.
G. M. C.	K-41A	2,775		158 1/2	58 1/2	61	36x4	36x7	own...	4	4x5 1/2	25.6	ft	t&pu.	hol. crk.	Mar.	1 1/4	grv.	own.	18	mag	Eism.	Remy.	no	Remy.
Giant	162	3,050		144	58 1/2	58 1/2	36x4	36x7	Cont...	4	4x5 1/2	27.2	ft	pu	cir-spl.	Shb.	1 1/4	grv.	Phar.	13.85	mag	Eism.	Delco.	yes	Delco.
Hahn	DE			158	58	58	36x4	36x7	Cont...	4	4x5 1/2	27.2	ft	pu	hol. crk.	Z&S	1 1/4	grv.	Phar.	13.85	mag	Eism.	Delco.	yes	Delco.
Indiana	20			150	58	59 1/2	36x4	36x7	own...	4	4x5 1/2	27.2	ft	pu	hol. crk.	Stmbg.	1 1/4	grv.	Pier.	15	mag	Eism.	West.	yes	West.
International	41	2,100		129	56	56	36x3 1/2	36x5	own...	4	4x5 1/2	19.6	ft	pu	cir-spl.	Ens.	1 1/4	grv.	own.	17.2	mag	Eism.	Bos.	yes	Bos.
Kimball	AB	3,675		136	58	58	36x4	36x7	Wis...	4	4x6	25.6	ft	pu	hol. crk.	Mast.	1 1/4	vac		17	mag	Eism.	West.	yes	West.
Kimball	AC	3,975		158	58	58	36x4	36x8	Wis...	4	4x6	29.0	ft	pu	hol. crk.	Mast.	1 1/4	vac		17	mag	Eism.	West.	yes	West.
Kleiber		3,600		156	58 1/2	58 1/2	36x4	36x7	Cont...	4	4x5 1/2	27.2	ft	pu	hol. crk.	Stmbg.	1 1/4	grv.	Sim.	19.5	mag	Eism.	Bos.	yes	Bos.
Maccar	H-A	3,100		162	58 1/2	58 1/2	36x4	36x4 1/2	Cont...	4	4x5 1/2	27.2	ft	pu	hol. crk.	Zenith.	1 1/4	grv.	Mue.	19.5	mag	Eism.	Bos.	yes	Bos.
Mack	AB	3,300		144	58 1/2	62 1/2	36x4	36x4 1/2	own.	4	4x5 1/2	25.6	ft	pu	cir-spl.	Shb.	1 1/4	grv.	own.	19.54	mag	Eism.	L-N	yes	L-N
Mack	AB	3,750		144	58 1/2	61 1/2	36x4	36x4 1/2	own.	4	4x5 1/2	25.6	ft	pu	cir-spl.	Shb.	1 1/4	grv.	own.	17.95	mag	Eism.	L-N	yes	L-N
Mapleleaf	AA	4,150		144	57 1/2	62	36x4	36x7	Hin	4	4x5 1/2	25.6	ft	pu	hol. crk.	Stmbg.	1 1/4	vac	Hin	18	mag	Eism.	West.	yes	West.
Menominee	D	3,245		144	58 1/2	57 1/2	36x4	36x8	Wis	4	4x6	25.6	ft	pu	hol. crk.	Stmbg.	1 1/4	grv.	Dup.	16.5	mag	Eism.	Bos	yes	Bos
Nash	2018	2,550		141	58 1/2	58 1/2	34x4	34x6	own	4	4x5 1/2	22.5	ft	pu	hol. crk.	Stmbg.	1 1/4	grv.	Dup.	17	mag	Eism.	Au-L.	yes	Au-L
Noble	C-40	2,675		160	56	57	36x4	36x7	Bud.	4	4x5 1/2	25.6	ft	pu	hol. crk.	Stmbg.	1 1/4	vac	Pier.	15	mag	Eism.	West.	yes	West.
Packard	EC	3,500		144	58 1/2	55	36x3 1/2	36x6	own.	4	4x5 1/2	28	ft	pu	cir-spl.	own.	1 1/4	pres.	own.	15	mag	Eism.	Dix.	yes	Bijur.
Packard	EX	3,575		141	58 1/2	55	36x3 1/2	40x8p	own	4	4x5 1/2	28	ft	pu	cir-spl.	own.	1 1/4	pres.	own.	27	mag	Eism.	Dix.	yes	Bijur.
Patriot	Lincoln	2,050		140	56	58	34x3 1/2	34x5	Hin	4	4x5 1/2	25.6	ft	pu	hol. crk.	Stmbg.	1 1/4	vac		27	mag	Eism.	Spl.	yes	Bijur.
Pierce Arrow	X-5	3,200		150	58 1/2	61	36x4	36x4 1/2	own.	4	4x5 1/2	25.6	ft	pu	hol. crk.	Stmbg.	1 1/4	pres.	own.	18	bat..	Delco.	Delco.	\$80	Delco
Power	F			140	60	60	36x6p	40x8p	Hin.	4	4x5 1/2	29.0	ft	pu	hol. crk.	Zenith.	1 1/4	grv.	Hin.	22	mag	Eism.	West.	no	West.
Rainier	R-18	2,890		147			34x4	34x6	Cont	4	4x5 1/2	27.2	ft	pu	cir-spl.	Zenith.	1 1/4	vac	Pier.	16	mag	Eism.	West.	yes	West.
Schacht	F	3,200		156	65	55	36x4	36x7	Bud	4	4x5 1/2	28.9	ft	pu	hol. crk.	Shb.	1 1/4	grv.	Dup.	15	mag	Eism.	Bos.	yes	West.
Schwartz	B2W	2,600		140	56	57	34x3 1/2	34x6	Bud.	4	3 1/2x5 1/2	22.5	ft	pu	hol. crk.	Stmbg.	1 1/4	grv.	Mon.	18	bat. mag	Eism.	Bos.	yes	GAD
Service	31			150	58	58	36x3 1/2	36x6	Bud.	4	4x5 1/2	25.6	ft	pu	hol. crk.	Stmbg.	1 1/4	vac		18	mag	Eism.	West.	yes	West.
Service	36			158	58	58	36x6p	38x7p	Bud	4	4x5 1/2	22.4	ft	pu	hol. crk.	Stmbg.	1 1/4	vac		16	mag	Eism.	West.	yes	West.
Sterling		3,085		142	58 1/2	58 1/2	36x4	36x6	own	4	4x5 1/2	25.6	ft	pu	hol. crk.	Zenith.	1 1/4	vac	Wau	16	bat..	Eism.	West.	yes	GAD
Stoughton	D	2,800		140 1/2	56	56	36x4	36x7	Her.	4	4x5 1/2	25.6	ft	pu	hol. crk.	Stmbg.	1 1/4	grv.	Dup	16	mag	Eism.	West.	yes	West.
Sullivan	E			150	58	61	36x4	36x7	Bud.	4	4 1/2x5 1/2	29.0	ft	pu	hol. crk.	Stmbg.	1 1/4	vac		13.4	mag	Eism.	West.	yes	Eism.
Super Truck	40			156	56	58	36x6p	40x8p	Wau	4	4x5 1/2	22.5	ft	pu	cir-spl.	Zenith.	1 1/4	grv.	Wau	16	mag	Eism.	N.E.	yes	Eism.
Triangle	C	2,700		147	56	54	36x4	36x6	Wau	4	4x5 1/2	22.5	ft	pu	cir-spl.	Stmbg.	1 1/4	grv.	Wau	16	mag	Eism.	N.E.	yes	Eism.
Velie	46	1,585		133	56	56	36x3 1/2	36x5	Cont.	4	4x5 1/2	22.5	ft	pu	hol. crk.	Stmbg.	1 1/4	grv.	M	18	mag	Eism.	West.	yes	West.
White	20	3,250		145 1/2	58 1/2	58 1/2	36x4	36x4 1/2	own.	4	4x5 1/2	22.5	ft	pu	hol. crk.	own.	1 1/4	grv.	own.	mag	mag	Eism.	West.	yes	West.
White	20-45	4,050		168	58 1/2	58 1/2	36x4	36x7	own.	4	4x5 1/2	24.0	ft	pu	hol. crk.	own.	1 1/4	grv.	own.	mag	mag	Eism.	West.	yes	West.
Wichita	M	2,800		144	56	58	36x3 1/2	36x6	Wau	4	4x5 1/2	22.5	ft	pu	cir-spl.	Stmbg.	1 1/4	grv	Wau	12 1/2	mag	Eism.	N.E.	yes	N.E.
Winther	49	3,250		147	56	56	36x4	34x4 1/2	Wis	4	4x5 1/2	25.6	ft	pu	hol. crk.	Stmbg.	1 1/4	grv.	Wau	17	mag	Eism.	West.	yes	Eism.

## ABBREVIATIONS—Types of Construction

\* Tires optional  
 \*\* Pneumatics extra  
 \*\*\* Pneumatics and oil  
 ions extra. Price includes load  
 bat—storage battery  
 bs—level stor  
 co—comp  
 col—collar  
 ch—chain  
 cir-spl—circulating splash  
 est-s—cast steel  
 cu—cushion  
 d-d—dry disk  
 d-o—disk in oil  
 d-pl—dry plate  
 flo—floating  
 fl-flo—floating  
 ft—fit tube  
 grv—gravity  
 hol. crk—hol. crk.  
 i—internal  
 mag—magnet  
 opt—optional  
 pl—plate  
 p—push  
 pres—pressure  
 p-st—plain steel  
 pt—plain tube  
 pu—pump  
 r-stl—cast steel  
 sh—spring  
 shb—shock absorber

## ABBREVIATIONS—Makers of Parts

A-K—American  
 Apo—Apo  
 Arc—Arc  
 Aut—Aut  
 B&W—B&W  
 BB—B&B  
 B&H—B&H  
 Bim—Bim  
 Ben—Ben  
 Ber—Ber  
 B&L—B&L  
 Bos—Bos  
 Bud—Bud  
 Car—Car  
 CAS—CAS  
 Cen—Cen  
 Cla—Cla  
 Col—Col  
 Cont—Cont  
 Conn—Conn  
 Cot—Cot  
 C&T—C&T  
 Dax—Dax  
 Del—Del  
 Dela—Dela  
 Det—Det  
 Dic—Dic  
 Dix—Dix  
 D&H—D&H  
 Dun—Dun  
 Dup—Dup  
 Dur—Dur  
 Dyns—Dyna  
 Ent—Ent



## Gasoline Trucks on 1922 Market—Continued

TRANSMISSION SYSTEM											STEERING GEAR		WHEELS		FRAME				MAKE AND MODEL		
CLUTCH		GEARSET		POWER TAKE-OFF		REAR AXLE				Final Drive	Live Axle Type	Make	Model	Make	Type	Make	Material	Length from Cab to Rear		Maximum Body Length Recommended	
Make	Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction										Make		Model
own...	pl...	own...		4	no	yes...	own...		6 43	ls	flo...	Ros...	BL	Hoo...	wa	own...	p-stl	155 1/2		Autocar...	27-K
B-L...	d-d...	B-L...	30	3	no	yes...	Timken	6460	7 75	Worm.	1/2 flo.	Gem.	K...	Hoo...	wa	own...	p-stl			Brockway	S4
B-L...	d-d...	B-L...	35	3	no	yes...	Timken	6460	6 1/2	Worm.	1/2 flo.	Gem.	K...	Hoo...	wa	own...	p-stl			Brockway	SK
B-L...	d-d...	B-L...	35	4	no	no...	Tor...	C	9		flo...	Jac...			wa						
Cvt...	d-d...	Cvt...	M1	3	no	yes...	Shl...	W-1501	8 67	Worm.	1/2 flo.	Ros...	K	Bim...	wa	Detroit.	p-stl	120	192	Commerce	16
	d-d...			3	no	yes...	Shl...		8 75	Worm.	1/2 flo.	Ros...	K	Bim...	wa	own...	r-stl			Corbitt	C22
Gr. L...	pl...	Gr. L...	515	3	no...	yes...	Tor...	C	8		flo...	own...	M	StM...	wa	Detroit.	p-stl	119 1/2	144	Defiance	E
Ful...	d-d...	Ful...	GU5	4	no...	yes...	Rus...	S-3-201	10 2		flo...	Gem...	M	MWC.	wa	Detroit.	p-stl	127 1/2	148	Denby	134
RI 40	d-d...	Cvt...	RI 40	4	no...	yes...	Timken	6560	7 1/4	worm	flo...	Gem...	K	Sch...	wa	Sav...	p-stl			Diamond T.	U
Cvt...	d-d...	Cvt...		3	no	no	Shl...		6 5	worm	1/2 flo.	Ros...	BU	MWC...	wa	P&B	p-stl			Duplex	A
Det...	d-d...	Det...		4	no	yes	Timken	6560	8 1/2	worm	flo...	Gem	K	Sch...	wa	Detroit	p-stl	122	120	Duty	TE
own...	d-d...	own...		7	no	yes...	Timken		7 25	worm	flo...	own...		own	est...	Smi...	p-stl	126	138	G. M. C.	K-41A
B-L...	d-d...	B-L...	35	3	no	no	Timken	6560	9 1/4	worm	flo...	Ros...	BL	Wan	wa	Detroit.	p-stl			Giant	16
B-L...	d-d...	B-L...		3	no	no	Timken	6560	9	worm	flo...	Ros...	BL	Sh Bim	wa	P&B Sv	p-stl			Hahn	DE
B-L...	pl...	B-L...	35	4	no	yes...	Shl	W-103	7 75	worm	1/2 flo	Woh...		own	est...	own...	r-stl	126	126	Indiana	20
B-L...	d-d...	B-L...	50	4	no	yes...	Shl		6 5	worm	1/2 flo	own...		own	est...	P&B	p-stl	111 1/2	114	International	41
B-L...	d-d...	B-L...	35	4	no	no	Shl		7 1/4	worm	1/2 flo	Woh...		own	est...	P&B	p-stl	128 1/2		Kimball	AB
B-L...	d-d...	B-L...	50	4	no	no	Timken	W21	8 1/2	worm	1/2 flo	Woh...		Smi...	est...	P&B...	p-stl	128 1/2	156	Kimball	AC
B-L...	d-d...	B-L...	45	4	no	yes	Timken	6560	8 5	worm	flo...	Ros...	BL	Smi...	est...	P&B...	p-stl	144		Kleiber	H-A
own...	d-d...	own...	AB...	4	yes	own...	own...	AB...	6 99	ch...	1 flo	own...	AB	opt...	wa, est	own...	p-stl	120	138	Mack	AB
own...	d-d...	own...	AB...	4	yes	own...	own...	ABDR	7 60	ls	flo...	own...	AB	opt...	wa, est	own...	p-stl	120	138	Mack	AB
Ful	d-d...	Ful	GU7...	4	no	yes...	Shl	W-103	8 66	worm	1/2 flo	Ros...	BL	Domin	wa	own...	r-stl			Mapleleaf	AA
Cvt...	d-d...	Cvt...	A1	3	no	yes	Wis...	800J	8 66	worm	1/2 flo	Ros...	BL			own...	r-stl	131 1/2	144	Menominee	D
Det...	d-d...	Det...		4	no	yes	Shl...	W103	8 1/2	worm	1/2 flo	Lav...	B	Bim...	wa	Smi...	p-stl	131 1/2	144	Nash	2018
Ful	d-d...	Ful	L11	4	no	yes	Shl...	W103	8 1/2	worm	1/2 flo	Lav...	B	Bim...	wa	Sharon	p-stl	130 1/2	144	Noble	C-40
own...	d-d...	own...		4	no	no...	own...	10	7 25	worm	flo...	own...	EC	own...	wa-es	own...	r-stl	119	192	Packard	EC
own...	d-d...	own...		4	no	no	own...	N	8	worm	flo...	own...	EC	own...	wa-es	own...	r-stl	119	192	Packard	EX
Ful...	d-d...	Ful...	G-5...	4	no	yes	Empire	N	7 25	worm	1/2 flo	own...	EC	own...	wa-es	own...	r-stl	113	120	Patriot	Lincoln
Cvt...	d-d...	Cvt...	TA...	4	no	yes	Eat...	TA	9 3/4	worm	1/2 flo	Ros...		Day...	est...	P&B...	p-stl	125 1/2		Pierce Arrow	X-5
Ful...	d-d...	Ful...	GU...	4	no	yes	Vulcan	4R	7 75	worm	flo...	Ros...		StM...	wa	own...	r-stl	123 1/2		Power	F
B-L...	d-d...	B-L...	35	4	no	yes	Shl...	W-103	8 66	worm	1/2 flo	Ros...	BL	Jon	wa	P&B...	p-stl	123 1/2		Rainier	R-18
own...	d-d...	own...		4	no...	yes...	own...	W-1501	8 66	worm	flo...	own...		StM...	wa	own...	r-stl	140	144	Schacht	F
Ful...	d-d...	Ful...	GU-7...	4	no...	yes...	Shl	W-1501	8 75	worm	1/2 flo	Ros...	BL	Sch...	wa	P&B...	p-stl	120	132	Schwartz	B2W
B-L...	pl...	B-L...	50	4	no	yes	Timken	6460	7 7	worm	1/2 flo	Ros...	BL	Bim...	wa	Sav...	r-stl	121 1/2		Service	31
B-L...	d-d...	B-L...	35	4	no	yes	Timken	6560	7 7	worm	flo...	Ros...	BL	Bim...	wa						
B-L...	d-d...	B-L...	35	4	no	yes	Shl		8 66	worm	1/2 flo	Ros...	BL	Prud...	wa	Sav	p-stl	121 1/2	138	Service	36
B-L...	d-d...	B-L...	35	4	no	yes	Shl		8 66	worm	1/2 flo	Ros...	BL	Prud...	wa	Smi.	p-stl	126		Sterling	
B-L...	d-d...	B-L...	35	4	no	yes	Timken	6560	7 75	worm	flo...	Ros...	BL							Stoughton	D
Fuller...	d-d...	Fuller...	6115	3	no	yes...	Timken	6560	7 75	worm	flo...	Ros...	BL							Sullivan	E
Fuller...	d-d...	Fuller...		3	no	yes...	Wis...	800J	8 66	worm	1/2 flo	Lav...	B	Prud...	wa	P&B	p-stl	146	144	Super Truck	40
Fuller...	d-d...	Fuller...		3	no	yes...	Cla...	2-D	8		flo...	Gem.	K...	Nr, Roy	wa	Mas...	r-stl			Triangle	C
Dur...	d-d...	Dur...		3	no	yes	Tor...		8		flo...	own...		Bim...	wa	Dun...	p-stl	107 1/2		Velie	46
own...	pl...	own...		4	no	yes	own...		8		1/2 flo	own...		own...	est...	own...	p-stl	107 1/2		White	20
own...	pl...	own...		4	no	yes	own...		8		1/2 flo	own...		own...	est...	own...	p-stl	107 1/2		White	20-45
B-L...	pl...	B-L...	35	4	no	yes	Shl...	W-103	8 66	worm	1/2 flo	Ros...	BA	Rim	wa	own...	p-stl	127 1/2	138	Wichita	M
B-L...	pl...	B-L...	50	4	no	yes	Cla	2-D	8 1/2	worm	1/2 flo	Ros...	BL	Medway	est...	own...	p-stl	142	144	Winther	49

# Buyer's Specifications of Nationally Distributed

## SAE HORSEPOWER

1922 - 24  
1921 - 24

## WATER CIRCULATION

1922 PUMP  
1921 PUMP

## RADIATOR TYPE

1922 - FINNED TUBE  
1921 - FINNED TUBE

## ENGINE-BORE-STROKE

1922 - 4 5 1/2  
1921 - 4 5 1/2

## PRICE

1922 - \$3325  
1921 - \$3241

## GEARSET TYPE (AMIDSHIP)

1922 - 4 SPEEDS  
1921 - 4 SPEEDS

## FUEL FEED

1922 GRAVITY  
1921 GRAVITY

## FINAL DRIVE

1922 WORM  
1921 WORM

## FRAME

1922 PRESSED STEEL  
1921 PRESSED STEEL

2 1/2-TON

## CLUTCH TYPE

1922 - DRY-DISK  
1921 - DRY-DISK

## ELECTRIC SYSTEM

1922 STARTING AND LIGHTING AT EXTRA COST  
1921 (STARTING AND LIGHTING) OR LIGHTING AT EXTRA COST

## WHEELBASE

1922 164" N  
1921 164" N

## TIRES - FRONT-REAR

1920 - SOLID - SOLID  
1921 - SOLID - SOLID

## SIZE - FRONT REAR

1922 - 36x4 36x4d  
1921 - 36x4 36x7

CHASSIS				TIRES				ENGINE										ELECTRICAL EQUIPMENT									
MAKE AND MODEL		Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. Hp.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Fuel Feed	Governor Make	Truck M. P. H.	IGNITION		START-ING		LIGHT-ING	
						Front	Rear	Front	Rear								Make	Size				Current Source	Make	Make	Extra Cost	Make	Cost
Ace	A	2 1/2	\$2,795		156	58 1/2		36x4	36x4d	Bud.	4	4 1/2 x 5 1/2	28 9	cel.	pu.	hol. erk.	Zenith.	1 1/2	vac.	Dup.	16	mag.	Eism.	West.	yes.	West.	yes.
Acme	A	2-2 1/2			148	58 1/2	58 1/2	36x4	36x7	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Ray.	1 1/2	vac.	Dup.	17	mag.	Eism.	Day.	yes.	Day.	yes.
Acme	AC	2 1/2			156	58 1/2	58 1/2	36x4	36x7	Cont.	4	4 1/2 x 5 1/2	32 40	cel.	pu.	hol. erk.	Zenith.	1 1/2	vac.	Dup.	30	mag.	Eism.	Day.	yes.	Day.	yes.
American	25	2 1/2	3,350		158	58	50 1/2	36x4	36x4d	Wis.	4	4x6	25 60	cel.	pu.	pres.	Stm.	1 1/2	grv.	own.	18	mag.	Apo.	West.	yes.	West.	no.
Armleder	HW	2 1/2			148	58 1/2	63 1/2	36x4*	36x7*	Bud*	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Zenith.	1 1/2	vac.	Phar.	15	mag.	Bos.	West.	yes.	West.	yes.
Atterbury	7CX	2 1/2	3,175		153 1/2	60	58 1/2	34x4	36x4d	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Zenith.	1 1/2	grv.	Mon.	15	mag.	Eism.				
Available	H2	2 1/2	3,160		152	56	58	36x4	36x8	Her.	4	4x5 1/2	25 1	ft.	pu.	hol. erk.	Stm.	1 1/2	vac.	Pier.	16	mag.	Bos.	Bos.	yes.	Bos.	yes.
Bessemer	J-2	2 1/2	2,595		158	58	58	36x4	36x4d	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Pier.	17	mag.	Eism.	Bos.	yes.	Eism.	yes.
Clydesdale	65X	2 1/2	3,450			60	58 1/2	36x4*	36x4d*	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Zenith.	1 1/2	grv.	own.	17	mag.	Bos.	Bos.	yes.	Eism.	yes.
Clydesdale	65EX	2 1/2	3,475			60	58 1/2	36x4*	36x4d*	Cont.	4	4 1/2 x 5 1/2	32 4	cel.	pu.	hol. erk.	Zenith.	1 1/2	grv.	own.	17	mag.	Bos.	Bos.	yes.	Eism.	yes.
Commerce	G	2 1/2			148	56	60	36x4	36 x7	Hin.	4	4x5 1/2	25 6	cel.	pu.	hol. erk.	Stm.	1 1/2	vac.	Hin.	14	mag.	Dix.	West.	yes.	West.	no.
Commerce	18	2 1/2			149			36x6p	38x7p	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Zenith.	1 1/2	vac.	own.	30	mag.	Eism.	Bijur.	no.	Eism.	no.
Corbitt	B22	2 1/2	3,000		152	58	60	36x4	36x7	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Zenith.	1 1/2	grv.	Sim.	16	mag.	Eism.	West.	yes.	Eism.	yes.
Day-Elder	D	2-2 1/2	2,400		144	56	62 1/2	36x4	36x7	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Zenith.	1 1/2	vac.	Mon.	11	mag.	Eism.	West.	yes.	Eism.	yes.
Dependable	E	2-2 1/2	2,950		165	58	59 1/2	36x4	36x7	Bud.	4	4 1/2 x 5 1/2	28 9	cel.	pu.	hol. erk.	Zenith.	1 1/2	vac.	Mon.	16	mag.	Eism.	Spl.		Eism.	yes.
Federal	UE	2 1/2	2,425		156	58 1/2	60 1/2	36x4	36x4d	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Zenith.	1 1/2	grv.	Phar.	13	mag.	Eism.	Au-L.	yes.	Au-L.	yes.
Gary	J	2 1/2	4,250		148	58 1/2	58 1/2	36x4	36x7	Bud.	4	4 1/2 x 5 1/2	32 4	cel.	pu.	hol. erk.	Mas.	1 1/2	vac.	McC.	15	mag.	Eism.	Delco	yes.	Delco	yes.
Hahn	EE	2 1/2			162			36x4	36x8	Cont.	4	4 1/2 x 5 1/2	32 4	cel.	pu.	hol. erk.	St-Zn.	1 1/2	grv.	Phar.	15	mag.	Eism.	Delco	yes.	Delco	yes.
Hall		2 1/2	3,275		156	58	58	36x4	36x4d	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Zenith.	1 1/2	grv.	Dup.	22	mag.	W. L.	West.	yes.	Eism.	yes.
Indiana	25	2 1/2			156	58	58	36x4	36x8	own.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Pier.	15	mag.	Eism.	West.	yes.	West.	yes.
Kalamazoo	H	2 1/2	3,275		160	58	58	36x4	36x8	Wis.	4	4x6	25 6	cel.	pu.	hol. erk.	Stm.	1 1/2	vac.	Pier.	15	mag.	Bos.	Dyn.	yes.	Dyn.	yes.
Kissel	Freighter	2 1/2			168	57 1/2	57 1/2	36x4	36x7	own.	4	4 1/2 x 5 1/2	32 4	cel.	pu.	hol. erk.	Zenith.	1 1/2	grv.	Pier.	12	mag.	Eism.	West.	yes.	Eism.	yes.
Kleiber	2 1/2	2 1/2	3,950		160	58 1/2	58 1/2	36x5	36x8	Cont.	4	4 1/2 x 5 1/2	32 4	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Sim.	16	mag.	Eism.	West.	yes.	Eism.	yes.
Koehler	M	2 1/2	3,175		165	56 1/2	58	36x4	36x7	Her.	4	4x5 1/2	25 6	cel.	pu.	hol. erk.	Zenith.	1 1/2	grv.	Sim.	16	mag.	Eism.	Spl.		West.	yes.
Larrabee	K-4	2 1/2	3,200		158	59	61	36x4	36x8	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Zenith.	1 1/2	grv.	Phar.	15	mag.	Eism.	West.	yes.	Eism.	yes.
Mack	A B Chain	2 1/2	3,400		144	58 1/2	62 1/2	36x4	36x4d	own.	4	4x5	25 6	cel.	pu.	hol. erk.	Shb.	1 1/2	grv.	own.	14.5	mag.	Eism.	West.	yes.	Eism.	yes.
Mack	AB	2 1/2	3,850		144	58 1/2	61 1/2	36x4	36x4d	own.	4	4x5	25 6	cel.	pu.	hol. erk.	Shb.	1 1/2	grv.	own.	14.75	mag.	Eism.	West.	yes.	Eism.	yes.
Master	W	2 1/2	3,290		144	58 1/2	58	34x4	36x7	Bud.	4	4 1/2 x 5 1/2	28 9	cel.	pu.	hol. erk.	own.	1 1/2	vac.	McC.	13.8	mag.	Eism.	West.	yes.	Eism.	yes.
Master	D	2 1/2	3,540		144	58 1/2	58	34x4	36x7	Bud.	4	4 1/2 x 5 1/2	28 9	cel.	pu.	hol. erk.	own.	1 1/2	vac.	McC.	13.8	mag.	Eism.	West.	yes.	Eism.	yes.
Moreland	22C	2 1/2	3,500		168			36x4	36x8	Cont.	4	4 1/2 x 5 1/2	32 4	cel.	pu.	hol. erk.	Mas.	1 1/2	grv.	own.	21	mag.	Eism.	Spl.		Eism.	yes.
Noble	D50	2 1/2	2,950		162	56	56	36x4	36x8	Bud.	4	4 1/2 x 5 1/2	28 9	cel.	pu.	hol. erk.	Stm.	1 1/2	vac.	Pier.	15	mag.	Eism.	West.	yes.	West.	yes.
Onida	C	2 1/2	3,200		160	58	59	36x4**	36x8**	Hin.	4	4x5 1/2	25 6	cel.	pu.	hol. erk.	Stm.	1 1/2	vac.	Hin.	22	mag.	Bos*	West.	yes.	West.	yes.
Paige	54-20	2 1/2	3,400		150	58	58	34x4	34x8	Hin.	4	4 1/2 x 5 1/2	28 9	cel.	pu.	hol. erk.	Stm.	1 1/2	vac.	Sim.	17	mag.	Bos.	Remy	yes.	Remy	yes.
Rainier	R-20	2 1/2	3,550		165	58 1/2	58 1/2	34x4	34x7	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Zenith.	1 1/2	vac.	Pier.	16	mag.	Eism.	West.	yes.	Eism.	yes.
Sanford	W125	2 1/2	3,350		174	60	60	36x4	36x4d	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Pier.	15	mag.	Eism.	West.	yes.	Eism.	yes.
Selden	2 1/2-A	2 1/2	3,425		145	58 1/2	58 1/2	36x4	36x7	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Pier.	16	mag.	Eism.	N.E.	yes.	N.E.	yes.
Service	51	2 1/2			160	58 1/2	58 1/2	36x4	36x7	Bud.	4	4 1/2 x 5 1/2	28 9	cel.	pu.	hol. erk.	Stm.	1 1/2	vac.	own.	15	mag.	Eism.	West.	yes.	Eism.	yes.
Standard	76	2 1/2	2,800		140	58 1/2	58 1/2	36x4	36x7	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Mon.	15	mag.	Eism.	West.	yes.	Eism.	yes.
Sterling	2 1/2	2 1/2	3,290		156	58 1/2	58 1/2	36x4	36x4d	own.	4	4 1/2 x 5 1/2	30 63	cel.	pu.	hol. erk.	Zenith.	1 1/2	vac.	Wau.	15	bat.	Eism.			G&D	yes.
Super Truck	50	2 1/2	3,300		156	57	60 1/2	36x4	36x8	Wis.	4	4x6	25 6	cel.	pu.	hol. erk.	Zenith.	1 1/2	grv.	Sim.	12.22	mag.	Eism.	West.	yes.	Eism.	yes.
Tower	H-2	2 1/2	3,200		146	58	58	36x4	36x8	Cont.	4	4 1/2 x 5 1/2	27 23	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Pier.	15	mag.	Eism.	West.	yes.	Eism.	yes.
Triangle	B	2 1/2	2,950		150	56	58	36x4	36x7	Wau.	4	4x5 1/2	25 6	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Wau.	16	mag.	Eism.			Spl.	yes.
Union	FW	2 1/2			140	55	56	36x5	36x8	Wis.	4	4x6	25 6	cel.	pu.	hol. erk.	Shb.	1 1/2	grv.	Dup.	15	mag.	Eism.	L-N.	yes.	L-N.	yes.
United	BT	2 1/2			171	56	56	36x4	36x7	Bud.	4	4 1/2 x 5 1/2	28 9	cel.	pu.	hol. erk.	Stm.	1 1/2	vac.	Sim.	15	mag.	Eism.	West.	yes.	Eism.	yes.
Veteran	A	2 1/2	4,000		156	58	59 1/2	36x4	36x7	Bud.	4	4 1/2 x 5 1/2	28 9	cel.	pu.	hol. erk.	Zenith.	1 1/2	vac.	Dup.	18	mag.	Eism.	West.	yes.	Eism.	yes.
Veteran	D	2-2 1/2	4,400		156	58	58	36x4	36x7	Bud.	4	4 1/2 x 5 1/2	28 9	cel.	pu.	hol. erk.	Zenith.	1 1/2	vac.	Dup.	18	mag.	Eism.	N.E.	yes.	N.E.	yes.
Wichita	R	2 1/2	3,000		144	56	58	36x4**	36x7**	Wau.	4	4 1/2 x 5 1/2	22 5	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Wau.	12	mag.	Eism.	N.E.	yes.	N.E.	yes.
Wichita	RX	2 1/2	3,600		160	56	56	36x4**	36x7**	Wau.	4	4 1/2 x 5 1/2	30 63	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Wau.	12	mag.	Eism.	N.E.	yes.	N.E.	yes.
Wilcox Trux	C	2 1/2			150			36x4**	36x8**	own.	4	4 1/2 x 5	28 9	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	Dup.	18	mag.	Eism.	West.	yes.	West.	yes.
Winther	50	2 1/2	3,995		110			36x8p	42x9p	Wis.	4	4x6	25 6	cel.	pu.	hol. erk.	Mas.	1 1/2	vac.	own.	13	mag.	Eism.	West.	yes.	West.	yes.
Winther	450	2 1/2	3,690		150			36x8p	42x9p	Wis.	4	4x5	25 6	cel.	pu.	hol. erk.	Stm.	1 1/2	grv.	own.	13	mag.	Eism.	West.	yes.	West.	yes.



# Gasoline Trucks on 1922 Market—Continued

## ABBREVIATIONS—Types of Construction

\* Tires optional  
 \*\* Pneumatics Extra  
 \*\*\* Pneumatics and cushions extra. † Price includes body  
**bat**—storage battery  
**bs**—bevel spur  
**c**—cone  
**cel**—cellular  
**ch**—cham  
**ch-spl**—calculating splash  
**cs**—cast steel  
**cu**—cushion  
**d-d**—dry disk  
**d-o**—disk in oil  
**d-p**—dry plate  
**flo**—floating  
**1/2 flo**—semi-floating  
**ft**—fin tube  
**grv**—gravity  
**holerk**—holley crank  
**i**—internal rest  
**mag**—magnet  
**opt**—optional

**pl**—plate  
**p**—pneumatic  
**pres**—pressure  
**p-stl**—pressed steel  
**pt**—plain tube  
**pu**—pump  
**r-stl**—rolled section  
**s-b**—spiral bevel  
**st-b**—straight Bevel  
**t**—Thermo-siphon  
**vac**—vacuum  
**wa**—wood artillery  
**wd**—wood disk

## Makers of Parts

**A-K**—Atwater Kent  
**Apo**—Apollo  
**Are**—Archibald  
**Aut**—Auto Lite  
**AutW**—Auto Wheel  
**B-B**—Borg & Beck  
**Bij**—Bijur  
**Bim**—Bimel  
**Ben**—Bendix

**Ber**—Berling  
**B-L**—Brown-Lape  
**Bos**—Bosch  
**Bud**—Buda  
**Car**—Carter  
**CAS**—CAS Products  
**Can**—Central  
**Cl**—Clark  
**Col**—Columbia  
**Cont**—Continental  
**Conn**—Connecticut  
**Cot**—Cotta  
**Cvt**—Covert  
**Day**—Dayton  
**Del**—DeLeon  
**DeLa**—DeLaney  
**Det**—Detroit  
**Dit**—Ditwiler  
**Dix**—Dixie  
**Dob**—Dobhoff  
**Dun**—Dundore  
**Dup**—Duplex  
**Dur**—Durstun  
**Dyn**—Dynco  
**Eat**—Eaton  
**Eism**—Eisemann  
**Ens**—Ensign

**E & O**—Eberly & Oris  
**Est**—Estler  
**GBS**—Golden, Belknap & Swartz  
**G&D**—Gray & Davis  
**Gem**—Gemmner  
**Gr**—Grant Lees  
**Hay**—Haynes  
**Hels**—Hole Shaw  
**Her**—Heracles  
**Hin**—Hinkley  
**Hoo**—Hoopes Bros.  
**Hrt**—Hartford  
**HS**—Herschell-Spillman  
**Hyd**—Hydraulic  
**Ind**—Indestructible  
**IRM**—Iron Mountain  
**Jac**—Jacobs  
**John**—Johnson  
**Jon**—Jones  
**Kel**—Kelley  
**King**—Kingston  
**KW**—KW Ignition Co.  
**Lav**—Lavine  
**LeR**—LeRoi  
**L-N**—Leece Neville  
**Lye**—Lycoming

**Mar**—Marvel  
**Max**—Master  
**McC**—McCanna  
**M&E**—Merchant & Evans  
**Mid**—Midwest  
**Mon**—Monarch  
**Mue**—Mueller  
**Mun**—Munroe  
**MWC**—Motor Wheel Corp.  
**NE**—North East  
**Nor**—Northway  
**P&B**—Parish & Bingham  
**Phar**—Pharo  
**Pier**—Pierce  
**Prud**—Prudden  
**Ray**—Rayfield  
**Rmy**—Remy  
**Roy**—Royce  
**Ros**—Ross  
**Russ**—Russell  
**Sag**—Saginaw Products Co.  
**Sal**—Salisbury  
**Sav**—Savage  
**Sch**—Schwartz

**Shb**—Shelher  
**Shl**—Shawson  
**Sim**—Simplex  
**Smi**—Smith  
**Spl**—Splittorf  
**Stan**—Standard Parts Co.  
**Stan**—Standard  
**StM**—St. Mary  
**Stmbg**—Stromberg  
**Stw**—Stewart  
**Tea**—Teagle  
**Thom**—Thompson  
**Til**—Tillotson  
**Tim**—Timken  
**Uni**—Universal  
**Ves**—Vesta  
**Wal**—Walker  
**Wan**—Wayne  
**War**—Warner Corp.  
**Wau**—Waukegan  
**Weid**—Weidely  
**Wes**—Western Wheel Co.  
**Wis**—Wisconsin  
**Woh**—Wohlrab  
**West**—Westinghouse  
**Zen**—Zenith

TRANSMISSION SYSTEM										STEERING GEAR		WHEELS		FRAME		Length from Cab to Rear	Maximum Body Length Recommended	MAKE AND MODEL	
CLUTCH		GEARSET		POWER TAKE-OFF		REAR AXLE			Live Axle Type	Make	Model	Make	Type	Make	Material				
Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction											Final Drive
d-d	Fuller		4	no	yes	Timken		7 75	worm	1/2 flo	Ros	BL	Sch	wa	own	p-stl	135 1/2	144	Ace
d-d	Cotta	RU	4	yes	yes	Timken	6560	9 1	worm	1/2 flo	Ros	BL	Bim	wa	Smi	p-stl			Acme
d-d	Cotta	RU	4	yes	yes	Timken	6560	6	worm	1/2 flo	Ros	BL	Bim	wa	Smi	p-stl			Acme
d-d	Cotta	RU	4	no	yes	Thom	B-1300	8 1/2	worm	1/2 flo	Ros	BL	Ind	p-stl	Sharon	p-stl	143 1/2	144	American
d-d	B-L	50	4	yes	yes	Timken	6560	9 25	worm	1/2 flo	Ros	BL	StM	wa	Smi	p-stl			Armleder
d-d	B-L	35	4	no	yes	Timken	6560	9 25	worm	1/2 flo	Gem	T	Are	wa	Sav	p-stl			Atterbury
d-d	B-L	35	4	no	yes	Timken	6560	8 5	worm	1/2 flo	Ros	BL	StM	wa	own	r-stl	144	144	Available
d-d	B-L	50	4	no	no	Tor	C	8	1/2 flo	1/2 flo	Ros	BL	Sch	wa	P&B	p-stl	142 1/2	144	H2 1/2
d-d	B-L	50	4	no	no	Timken	6560	8 1/2	worm	1/2 flo	Ros	BL	Smi	cs&s	P&B	p-stl	137		Clydesdale
d-d	B-L	50	4	no	no	Timken	6560	8 1/2	worm	1/2 flo	Ros	BL	Smi	cs&s	P&B	p-stl	132	132	Clydesdale
E	B-L	50	4	no	no	Timken	6560	8 1/2	worm	1/2 flo	Ros	BL	Smi	cs&s	P&B	p-stl	130	144	6 5-E
d-d	Cotta	A	4	no	yes	Ras	N9-400	9 45	worm	1/2 flo	own	own	Detroit	wa	own	r-stl	130		Columbia
d-d	B-L	35	4	no	no	Tor	C	9		1/2 flo	Jac			wa	Detroit	p-stl			Commerce
d-d	B-L	50-4	4	no	yes	Shl	W-21	8 75	worm	1/2 flo	Ros		Bim	wa	own	r-stl	125	132	Corbitt
d-d	Cvt	RU	4	No	yes	Shl	W-103	8 66	worm	1/2 flo	Ros	K	Jon	wa	Sav	p-stl			Day-Elder
d-d	Fuller	G7	4	no	yes	Wis	900C	8 66	worm	1/2 flo	Ros	BL	Bim	wa	P&B	p-stl	152	164	Dependable
d-d	Detroit		4	no	yes	Timken	6560	9 25	worm	1/2 flo	Gem	K	Sch	wa	Detroit	p-stl	144 1/2	162	Federal
d-d	Fuller	GU5	4	yes	yes	Timken	HDR	8 5	worm	1/2 flo	Ros	BL	Sch	wa	own	p-stl			Gary
d-d	B-L		4	no	no	Timken	6560	7 75	worm	1/2 flo	Ros	BL	Sh, Bim	wa	Sy, P&B	p-stl	145 1/2	162	J Hahn
d-d	B-L	35	4	no	yes	Timken	6560	7 75	worm	1/2 flo	Gem	K	Smi	cs&s	own	r-stl	144	144	Hall
pl	B-L	50-A	4	no	yes	Shl	W-21	8 75	worm	1/2 flo	Woh	3	Day	cs&s	own	r-stl	138	138	Indiana
d-d	Fuller	G7	4	no	yes	Shl	W-21	8 75	worm	1/2 flo	Ros	BL	Smi	cs&s	own	r-stl	145 1/2	162	Kalamazoo
d-d	War	U-30-A	4	no	yes	Timken	6560	8 5	worm	1/2 flo	Ros	BL	Prud	wa	Smi	p-stl	144	144	Kissel
d-d	B-L	60	4	no	no	Timken	6560	8 5	worm	1/2 flo	Ros	BM	Smi	cs&s	own	r-stl	150	162	Freighter
d-d	B-L	35	4	no	yes	Timken	6560	9 25	worm	1/2 flo	Lav		Wan	wa	own	p-stl			Kleiber
d-d	B-L	50	4	no	yes	Shl	W-21	8 75	worm	1/2 flo	Ros	BL	Smi	cs&s	Sav	p-stl	120	144	Mack
d-d	own	AB	4	yes	yes	own	ABR	6 99	1/2 flo	1/2 flo	own	AB	pr	wa, cs&s	own	p-stl	120	138	A B Chain
d-d	own	AB	4	yes	yes	own	ABDR	9 25	BS	1/2 flo	own	AB	own	wa, cs&s	own	p-stl	120	138	Mack
d-d	Fuller	GU7	4	no	yes	Timken	6560	8 5	worm	1/2 flo	Ros	BL	Prud	wa	P&B	p-stl	132	138	Master
d-d	Fuller	GU7	4	no	yes	Wal	25A	8 49	worm	1/2 flo	Ros	BL	Cl, Wlk	cs&s	P&B	p-stl			Master
d-d	own		4	no	yes	Timken			worm	1/2 flo	Ros		Smi	cs&s	Smi	p-stl			Moreland
d-d	Fuller	G7	4	no	yes	Shl	W-21	8 1/2	worm	1/2 flo	Lav	B	Bim	wa	Shar	p-stl	138 1/2	144	Noble
d-d	Fuller	G7	4	no	yes	Wis	900C	8 66	worm	1/2 flo	Ros	BL	StM	wa	own	p-stl	125 1/2	144	Oneida
d-d	B-L	50	4	no	no	Shl	W-21	8 75	worm	1/2 flo	Ros	BL	Day	cs&s	Hyd	p-stl	125 1/2	144	Paige
d-d	B-L	50	4	no	no	Timken	6560	8 5	worm	1/2 flo	Ros	BL	Jon	wa	Parish	p-stl	137 1/2		Rainier
d-d	B-L		4	no	yes	Shl		8 7	worm	1/2 flo	Ros	BL	Hoo	wa	P&B	p-stl	144 1/2	144	Sanford
d-d	B-L		4	no	yes	Timken			worm	1/2 flo	Gem		Stan	cs&s	own	p-stl	134 1/2	144	W-125
pl	B-L	50	4	no	no	Timken	6560		worm	1/2 flo	Ros	BL	Bim	wa	Sav	r-stl	141 1/2		2 1/2-A
d-d	B-L	45	4	no	no	Timken	6560	8 5	worm	1/2 flo	Ros	BL		wa		r-stl	122	120	Service
d-d	B-L	50	4	no	yes	Timken	6560	7 7	worm	1/2 flo	Ros	BL	Prud	wa	Smi	p-stl	96	174	Standard
d-d	Fuller	G7	4	no	yes	Shl	W21	8 75	worm	1/2 flo	Lav	B	Prud	wa	P&B	p-stl			2 1/2
d-d	Fuller	G7	4	no	yes	Timken	6560		worm	1/2 flo	Ros	BL		wa		p-stl			Super Truck
d-d	Fuller	GU7	4	no	yes	Cl	2-D	9		1/2 flo	Gem	K	Nr, Roy	wa	Mas	r-stl	132	138	Tower
d-d	Fuller	GU5	4	no	yes	Wal	25A	7 66	B	1/2 flo	Ros	BL	Wal, Pr	cs&s	own	p-stl			H
d-d	Fuller	G7	4	no	yes	Shl	W-21	8 75	worm	1/2 flo	Lav			cs&s	own	p-stl			Triangle
d-d	Cotta		4	no	yes	Shl		6 5	worm	1/2 flo	Ros		Smi	cs&s	own	r-stl			B
d-d	Cotta	RU	4	no	yes	Shl	W-21	7 75	worm	1/2 flo	Ros	BL	Smi	cs&s	own	r-stl			FW
C	B-L	35	4	no	yes	Shl	W-21	10-33	worm	1/2 flo	Ros	BA	Day	cs&s	own	p-stl	127	148	BT
C	B-L	50	4	no	yes	Shl	W-21	8 75	worm	1/2 flo	Ros	BF	Day	cs&s	own	p-stl	128	144	A
d-d	own		4	no	yes	Wal			worm	1/2 flo	wa	Smi	cs&s	Smi	p-stl	141	162	Veteran	
d-d	B-L	50	4	no	yes	Cl	2D	8	1/2 flo	1/2 flo	Ros	BL	own	cs&s	own	r-stl	74	96	Winther
d-d	Fuller	ITU-5	3	no	yes	Cl		12	1/2 flo	1/2 flo	Lav	B	Med	cs&s	own	r-stl	142	144	450



# Buyer's Specifications of Nationally Distributed

RADIATOR TYPE  
1922 - FINNED TUBE  
1921 - FINNED TUBE

S.A.E. HORSEPOWER  
1922 - 32.40  
1921 - 32.40

PRICE  
1922 - \$4193  
1921 - \$4292

3½-TON

WATER CIRCULATION  
1922 - PUMP  
1921 - PUMP

FUEL FEED  
1922 - VACUUM  
1921 - GRAVITY

WHEELBASE  
1922 - 165 IN.  
1921 - 167 IN.

GEARSET TYPE (AMIDSHIP)  
1922 - 4-SPEEDS  
1921 - 4-SPEEDS

FINAL DRIVE  
1922 - WORM  
1921 - WORM

FRAME  
1922 - PRESSED STEEL  
1921 - PRESSED STEEL

CLUTCH TYPE  
1922 - DRY-DISK  
1921 - DRY-DISK

ELECTRIC SYSTEM  
1922 - STARTING & LIGHTING AT EXTRA COST  
1921 - STARTING & LIGHTING AT EXTRA COST

TIRES - FRONT-REAR  
1922 - SOLID - SOLID  
1921 - SOLID - SOLID

SIZE - FRONT-REAR  
1922 - 36x5 - 36x5d  
1921 - 36x5 - 36x5d

MAKE AND MODEL	CHASSIS				TIRES				ENGINE										ELECTRICAL EQUIPMENT						
	Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. H. P.	Radiator Type	Water Circulation	CARBU-RETER		Governor Make	Truck M. P. H.	IGNITION		START-ING		LIGHT-ING		
					Front	Rear	Front	Rear							Make	Size			Fuel Feed	Current Source	Make	Make	Extra Cost	Make	Extra Cost
Acme	C-31			168	66½	65½	36x5	40x5d	Cont.	4	4½x5½	32.4	pu	hol. crk.	Zenith.	1½	vac.	Dup.	13½	mag.	Eism.	Day..	yes	Day.	yes
American	404	4,275		158	65	60	36x5	36x5d	Wis.	4	4½x6	32.4	pu	pres.	Zenith.	1½	vac.	own.	15	mag.	Apo..	West..	yes	West.	no
Armleder..	KW			156	66½	69	36x5	36x5d	Bud*	4	4½x6	32.4	pu	hol. crk.	Zenith.	1½	vac.	Phar.	12	mag.	Bos..	West..	yes	West.	yes
Atterbury..	7DX	3,975		167½	66	67½	36x5	40x5d	Cont.	4	4½x5½	32.4	pu	hol. crk.	Zenith.	1½	vac.	Mon.	14	mag.	Eism.	Bos...	yes	Bos...	yes
Available	H3½	4,175		176	66½	65½	36x5	40x5d	Her...	4	4½x5½	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Pier...	14	mag.	Bos...	Bos...	yes	Bos...	yes
Bessemer	K-24	3,495		175	66½	69	36x5	36x5d	Cont.	4	4½x5½	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Pier...	14	mag.	Bos...	Bos...	yes	Bos...	yes
Brockway..	RT2			175	61	65½	36x5	36x10	Cont.	4	4½x5½	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Cont.	20	mag.	Eism.	N.E...	yes	N.E...	yes
Brockway..	R4			164	61	65½	36x5	36x10	Cont.	4	4½x5½	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Phar...	14½	mag.	Eism.	N.E...	yes	N.E...	yes
Brockway..	KR2			160	58	58	36x4	36x8	Cont.	4	4½x5½	27.23	pu	hol. crk.	Stmbg.	1½	vac.	Phar...	21	mag.	Eism.	N.E...	yes	N.E...	yes
Brockway..	K5	21-3		153	58½	58½	36x4	36x8	Cont.	4	4½x5½	27.23	pu	hol. crk.	Stmbg.	1½	vac.	Phar...	18	mag.	Eism.	N.E...	yes	N.E...	yes
Clydesdale.	90	4,125		170	66½	65½	36x5	40x5d	Cont.	4	4½x5½	32.4	pu	hol. crk.	Zenith.	1½	vac.	own.	16	mag.	Bos...	Bos...	yes	Eism.	yes
Corbitt..	R-22	3,200		159	58	60	36x4	36x8	Cont.	4	4½x5½	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Pier...	15	mag.	Eism.	Bos...	yes	Eism.	yes
Corbitt..	A-22	3,800		178	62	66	36x5	36x10	Cont.	4	4½x5½	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Pier...	14	mag.	Eism.	West..	yes	Eism.	yes
Day-Elder	C-21	2,750		150	56	60	36x4	36x7	Bud	4	4½x5½	28.9	pu	hol. crk.	Zenith.	1½	vac.	Mon.	14	mag.	Eism.	West..	yes	Eism.	yes
Day-Elder	F-24	3,150		165	57½	70½	36x5	36x5d	Cont.	4	4½x5½	32.4	pu	hol. crk.	Zenith.	1½	vac.	Mon.	12	mag.	Eism.	West..	yes	Eism.	yes
Denby..	25	3,300		150	60	62	36x4	36x7	Cont.	4	4½x5½	27.23	pu	hol. crk.	Stmbg.	1½	vac.	Mon.	27.3	mag.	Eism.	West..	yes	Eism.	yes
Denby..	27	4,200		170	65	70	36x5	36x10	Cont.	4	4½x5½	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Dup.	14	mag.	Eism.	West..	yes	Eism.	yes
Diamond T	K-3	3,750		170	66½	66½	36x5	36x5d	Hin.	4	4½x5½	28.9	pu	hol. crk.	Stmbg.	1½	vac.	Hin.	13	mag.	Bos...	West..	yes	Bos...	yes
Duplex....	E-31	4,250		130	60	60	36x8	36x8	Bud.	4	4½x5½	28.9	pu	hol. crk.	Shb...	1½	vac.	Dup.	15	mag.	Ben..	N.E...	yes	N.E...	yes
F. W. D....	B-3	4,200		124	56	56	36x6	36x6	Wis.	4	4½x5½	36.1	pu	hol. crk.	Stmbg.	1½	vac.	Pier...	10	mag.	Ben..	N.E...	yes	N.E...	yes
Federal....	WE	3,150		154	66½	67½	36x5	36x5d	Cont.	4	4½x5½	32.4	pu	hol. crk.	Zenith.	1½	vac.	Phar...	12	mag.	Ben..	N.E...	yes	N.E...	yes
G. M. C.	K-71	3,950		163	62	65	36x5	40x5d	own.	4	4½x6	32.4	pu	hol. crk.	Mar...	1½	vac.	own.	12	mag.	Eism.	Remy.	no	Remy.	yes
Gary	K-1	5,250		162	60	65	36x5	40x5d	Bud.	4	4½x6	32.4	pu	hol. crk.	Mar...	1½	vac.	McC.	12	mag.	Eism.	Remy.	no	Remy.	yes
Giant	17		4150	176	66½	65	36x5	36x5d	Cont.	4	4½x6	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Mon.	12	mag.	Eism.	Remy.	no	Remy.	yes
Hahn	F-31			191	66	66	36x5	36x10	Cont.	4	4½x5½	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Phar	18	mag.	Eis. Bs	Delco.	yes	Delco.	yes
Hall	4		4100	144	65	72	36x5	36x5d	Cont.	4	4½x5½	32.4	pu	hol. crk.	Zenith.	1½	vac.	Dup	18	mag.	Eis. Bs	West.	yes	West.	yes
Indiana	35			160	58	60	36x5	36x5d	own.	4	4½x5½	30.63	pu	hol. crk.	Stmbg.	1½	vac.	Pier...	14	mag.	Eism.	West.	yes	West.	yes
International	61	2,400		138½	61	61	34x4	36x6	own.	4	4½x5	28.9	pu	hol. crk.	Stmbg.	1½	vac.	own.	15.1	mag.	Dix...	Dyn...	yes	Dyn...	yes
Kalamazoo	K-31	4,000		160	62	66	36x5	36x10	Wis.	4	4½x6	28.9	pu	hol. crk.	Stmbg.	1½	vac.	Pier...	12	mag.	Bos...	Dyn...	yes	Dyn...	yes
Kimball	AK	4,500		172	58	58	36x5	36x10	Wis.	4	4½x6	32.4	pu	hol. crk.	Mas...	1½	vac.	mag.	16	mag.	Spl...	West..	yes	West.	yes
Kimball..	AE	5,000		164	62	65	36x5	40x5d	Wis.	4	4½x6	36.1	pu	hol. crk.	Zenith.	1½	vac.	mag.	12	mag.	Spl...	West..	yes	West.	yes
Kissel.....	Heavy Duty			168	62	66	36x5	36x5d	own.	4	4½x6	28.9	pu	hol. crk.	Stmbg.	1½	vac.	own.	12	mag.	Spl...	West..	yes	West.	yes
Kleiber	31	4,600		167	62	65	36x5	36x10	Cont.	4	4½x6	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Sim.	12	mag.	Spl...	West..	yes	West.	yes
Koehler	F-31	4,150		162	64	65	36x5	36x5d	Her...	4	4½x6	32.4	pu	hol. crk.	Zenith.	1½	vac.	Pier...	14	mag.	Spl...	West..	yes	West.	yes
Larrabee	L-4	4,000		160	64	66	36x5	36x5d	Cont.	4	4½x6	32.4	pu	hol. crk.	Zenith.	1½	vac.	Phar...	13	mag.	Bos...	Bos...	yes	Bos...	yes
Maccar..	M-A	4,200		156	66½	66½	36x5	36x5d	Cont.	4	4½x6	36.1	pu	hol. crk.	Zenith.	1½	vac.	Mue.	16.5	mag.	Eism.	Bos...	yes	Bos...	yes
Mack..	H-2	3,400		162	64	65	36x4	36x4d	Cont.	4	4½x6	32.4	pu	hol. crk.	Zenith.	1½	vac.	Mue.	20.5	mag.	own.	Bos...	yes	Bos...	yes
Mapleleaf	AC	4,950		168	64	71	36x5	40x5d	own.	4	4½x6	40.0	pu	hol. crk.	Stmbg.	1½	vac.	own.	16	mag.	Tea...	West..	yes	West.	yes
Mapleleaf	BB	4,775		150	58	58	36x4	36x4d	Hin...	4	4½x6	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Hin.	16	mag.	Eism.	West..	yes	West.	yes
Mapleleaf	CC	5,570		162	62	64	36x5	36x5d	Hin...	4	4½x6	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Hin.	12.5	mag.	Eism.	West..	yes	West.	yes
Master.....	A-31	4,190		154	62	64	36x5	40x5d	Bud.	4	4½x6	32.4	pu	hol. crk.	Mas...	1½	vac.	Pier...	11.5	mag.	Eism.	West..	yes	West.	yes
Master.....	E-31	4,640		154	62	64	36x5	40x5d	Bud.	4	4½x6	32.4	pu	hol. crk.	Mas...	1½	vac.	Pier...	11.5	mag.	Eism.	West..	yes	West.	yes
Menominee	G-31	4,270		160	62	64	36x5	36x10	Wis.	4	4½x6	32.4	pu	hol. crk.	Stmbg.	1½	vac.	own.	12.8	mag.	Eism.	Bos...	yes	Bos...	yes
Moreland..	22H	4,600		186	66	66	36x5	40x5d	Cont.	4	4½x6	36.1	pu	hol. crk.	Stmbg.	1½	vac.	own.	21	mag.	Spl...	West..	yes	West.	yes
Noble.....	E70	3,800		182	64	66	36x5	36x10	Bud.	4	4½x6	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Pier...	12	mag.	Eism.	West..	yes	West.	yes
Oneida	D-31	4,050		170	67	65½	36x5	36x10	Hin...	4	4½x6	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Hin.	18	mag.	West.	West..	yes	West.	yes
Packard....	ED	3,100		156	66	66	36x5	36x5	own.	4	4½x6	32.4	pu	hol. crk.	own	1½	vac.	own.	12	mag.	Bijur.	Remy.	yes	Bijur	yes
Paige	51-18			158	66	65	36x5	36x5d	Hin.	4	4½x6	32.4	pu	hol. crk.	Stmbg.	1½	vac.	Sim.	15	mag.	Bos...	Remy.	yes	Remy.	yes
Patriot....	Washington	2,900		156	66	64	36x4	36x7	Hin.	4	4½x6	32.4	pu	hol. crk.	Stmbg.	1½	vac.	mag.	16	mag.	Spl...	Delco.	yes	Delco.	yes
Pierce Arrow	W-2	4,350		162	66	65	36x5	36x5d	own.	4	4½x6	32.4	pu	hol. crk.	Stmbg.	1½	vac.	mag.	16	mag.	Spl...	Delco.	yes	Delco.	yes



## Gasoline Trucks on 1922 Market—Continued

## ABBREVIATIONS—Types of Construction

\*Tires optional  
 \*\*Pneumatics extra  
 \*\*\*Pneumatics and cushions extra. Price includes body.  
 bat storage battery  
 bs bevel spur  
 c cone  
 cel cellular  
 ch chain  
 cir-spl circulating splash  
 cot-s cast steel  
 cu cushion  
 d-d disk in oil  
 d-pl dry plate  
 flo floating  
 flo semi floating  
 ft fin tube  
 g gravity  
 hol-er hollow crank  
 i internal gear  
 mag magnet  
 opt optional

pl plate  
 p pneumatic  
 pres pressure  
 p-stl pressed steel  
 p-t plain tube  
 pu pump  
 r-stl rolled section  
 sb spiral bevel  
 st-b straight bevel  
 t thermo syphon  
 vac vacuum  
 wa wood artillery  
 wd wood disk  
 Makers of Parts  
 A-K Atwater Kent  
 Apo Apollo  
 Arch Archibald  
 Aut Auto Life  
 AW Auto Wheel  
 BB Borg & Beck  
 Bli Blair  
 Bim Bimbel  
 Ben Bendix  
 Ber Berling

B-L Brown Lape  
 Bos Bosch  
 Bud Buda  
 Car Carter  
 CAS CAS Products  
 Cen Central  
 Cla Clark  
 Col Columbia  
 Cont Continental  
 Conn Connecticut  
 Cot Cotta  
 Cvt Cover  
 Day Dayton  
 Del DeLoe  
 Dela Delaney  
 Det Detroit  
 Ditt Dittler  
 Dix Dixie  
 Ditt Dittler  
 Dun Dunlop  
 Dup Duplex  
 Dur Durston  
 Dyn Dyneto  
 Eat Eaton  
 Elm Eisenmann

Ens Ensign  
 E&O Liberty & Oris  
 Ful Fuller  
 GBS Golden, Belknap  
 Swartz  
 GD Gray & Davis  
 Gem Gemmer  
 Grl Grant Lees  
 Hay Haynes  
 Heis Hele Shaw  
 Her Hercules  
 Hin Hinkley  
 Hoo Hoopes Bros.  
 Hrt Hartford  
 Hyd Hydraulic  
 HS Herschell Spittman  
 Ind Indestructible  
 Iron Iron Mountain  
 Jac Jacoby  
 John Johnson  
 Jon Jones  
 Kel Kelsey  
 King Kingston  
 KW KW Ignition Co.  
 Lav Lavine  
 LeRo LeRo  
 L-N Lezer Neville

Lye Locoming  
 Mar Marvel  
 Mas Master  
 McC McCanna  
 M&E Merchant & Evans  
 Mid Midwest  
 Mon Monarch  
 Mue Mueller  
 Mun Munroe  
 MWC Motor Wheel Corp.  
 N.E. North East  
 Nor Northway  
 P&B Parish & Bingham  
 Phar Pharo  
 Pier Pierce  
 Pru Prudden  
 Ray Rayfield  
 Rmy Remy  
 Ros Rose  
 Roy Royer  
 Ros Ross  
 Russ Russell  
 Sag Saginaw Products Co.  
 Sal Salisbury  
 Sav Savage

Sch Schwartz  
 Shb Shebler  
 Shl Sheldon  
 Sim Simplex  
 Sni Smith  
 Spl Splittorf  
 Stan Standard Parts Co.  
 Stan Standard  
 STM-St. Mary  
 Strmbg Stromberg  
 Stw Stewart  
 Ten Teague  
 Thom Thompson  
 Tim-Timken  
 Uni Universal  
 Ves Vesta  
 Wal Walker  
 Wan Wayne  
 War Warner Corp.  
 Wei Weidley  
 Wes Western Wheel Co.  
 Wis Wisconsin  
 Woh Wohlrab  
 Wst Westinghouse  
 Zen Zenith

TRANSMISSION SYSTEM											STEERING GEAR		WHEELS		FRAME		MAKE AND MODEL				
CLUTCH		GEARSET		POWER TAKE-OFF		REAR AXLE									Length from Cab to Rear	Maximum Body Length Recommended					
Make	Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive	Live Axle Type	Make	Model	Make			Type	Make	Material		
B.	d-d	Cotta	S	1	yes	yes	Timken	6660	10 33	worm	flo	Ros	BM	Bim	wa	Smi	p-stl	150 1/2	162	Acme	C
L.	d-d	Cotta	R4	4	no	yes	Wis	6661	10 0	worm	1/2 flo	Lav	Ros	Ind	p-stl	Detroit	p-stl			American	40
L.	d-d	B-L	50	1	yes	yes	Timken	6660	10 33	worm	flo	Ros	BM	St M	opt	own	r-stl			Armleder	KW
L.	d-d	B-L	50	1	no	no	Timken	6660	10 33	worm	flo	Gem	R	Are	wa	Sav	p-stl	147 1/2	156	Atterbury	7DX
B.	d-d	B-L	50	1	no	yes	Timken	6660	19 33	worm	flo	Ros	BM	St M	wa	own	r-stl	168	168	Available	H3 1/2
L.	d-d	B-L	60	1	no	no	Timken	6660	10 25	worm	flo	Ros	BM	St M	wa	P&B	p-stl	157 1/2		Bessemer	K-2
L.	d-d	B-L	60	1	no	yes	Timken	6660	6 1/2	worm	flo	Gem	T	Smi	own	own	p-stl			Brockway	RT2
L.	d-d	B-L	75	1	no	yes	Timken	6660	8 75	worm	flo	Gem	T	Smi	own	own	p-stl			Brockway	R4
L.	d-d	B-L	75	1	no	yes	Timken	6660	6 1/2	worm	flo	Gem	K	Hoo	own	own	p-stl			Brockway	KR2
L.	d-d	B-L	35	1	no	yes	Timken	6660	7 75	worm	flo	Gem	T	Hoo	own	own	p-stl			Brockway	K5
L.	d-d	B-L	50	1	no	no	Timken	6660	10 33	worm	flo	Ros	BM	Smi	own	P&B	p-stl	143	144	Clydesdale	90
L.	d-d	B-L	50-4	1	no	yes	Shl		8 75	worm	1/2 flo	Ros	BM	Bim	own	own	r-stl			Corbitt	R-22
L.	d-d	B-L	70-4	4	no	yes	Shl	W-31	11 75	worm	1/2 flo	Ros		Smi	own	own	r-stl			Corbitt	A-22
L.	d-d	Cvt	B1	1	no	yes	Shl	W-21	8 75	worm	1/2 flo	Gem	T	Jon	own	Sav	p-stl	123	132	Day Elder	C
L.	d-d	B-L	50	1	no	yes	Shl	W-31	10 25	worm	1/2 flo	Gem	T	Jon	own	Sav	p-stl	148	156	Day Elder	F
Her.	d-d	Fuller	GU-5	4	no	yes	Rjs	U-2-301	9 45	1	1 1/2 flo	Gem	K	Smi	own	Detroit	p-stl	142 1/2	162	Denby	25
n.	d-d	War.	T-53	4	no	yes	Cl	3-D	10	1	1 1/2 flo	Ros	BM	Smi	own	Detroit	p-stl	140	170	Denby	27
L.	d-d	Cvt	SA4	4	no	yes	Timken	6660	8 75	worm	1 1/2 flo	Gem	R	Smi	own	Smi	p-stl			Diamond T	K
L.	d-d	B-L		1	yes	own	own		8 0		1 1/2 flo	Woh		MWC	wa	Parish	p-stl			Duplex	E
S.	d-o	Cotta	DA1	1	no	yes	own		8 9	stb	1 1/2 flo	Ros	BF	Sch	own	own	p-stl	136	138	F. W. D.	B
L.	d-d	War.		1	no	yes	Timken	6660	10 25	worm	flo	Gem		Smi	own	Detroit	p-stl			Federal	WE
p.	d-d	own		7	no	yes	Timken		8 75	worm	1	own		own	own	Smi	p-stl	144	168	G. M. C.	K-71
L.	d-d	B-L		4	yes	yes	Timken		10 3	worm	flo	Ros	BM	Smi	own	own	p-stl			Gary	K
L.	d-d	B-L	50	4	no	no	Timken	6660	10 33	worm	flo	Ros	BM	Wan	own	own	r-stl			Giant	17
L.	d-d	B-L	60	1	no	no	Timken	6660	10 25	worm	flo	Ros	BM	Sh. Bm.	wa	Parish	p-stl			Hahn	F
L.	d-d	B-L	50 1/4	1	no	yes	Timken	6652	10 7 1/2	worm	flo	Gem		Smi	own	own	r-stl	144	144	Hall	
L.	pl	B-L	55	1	no	yes	Shl	W-31		worm	1 1/2 flo	Woh	4	Day	own	own	r-stl	141	144	Indiana	35
n.	d-d	B-L	50	1	no	yes	own		9	1	flo	own		own	own	P&B	p-stl	118 1/2	121	International	61
Her.	d-d	Fuller	H17	4	no	yes	Shl	W-31	10 25	worm	1 1/2 flo	Ros	BM	Smi	own	own	p-stl	151 1/2	168	Kalamazoo	K
L.	d-d	B-L	50	1	no	no	Shl	W-21	7 4	worm	1 1/2 flo	Woh		Smi	own	P&B	p-stl	152 1/2		Kimball	AK
L.	d-d	B-L	60	1	no	no	Shl	W-21	8 75	worm	1 1/2 flo	Woh		Smi	own	P&B	p-stl	148 1/4	156	Kimball	AE
L.	d-d	War.	70 A	1	no	yes	Shl	W-31	11 75	worm	1 1/2 flo	Ros	BF	Smi	own	Smi	p-stl	156	156	Kissel	Heavy Duty
L.	d-d	B-L	60	1	no	no	Timken	6660	10 33	worm	flo	Ros	BM	Smi	own	own	r-stl	150	168	Kleiber	3 1/2
L.	d-d	B-L	55	1	no	yes	Timken	6660	10 33	worm	flo	Lav		Day	own	own	p-stl			Koehler	F
L.	d-d	B-L	55	1	no	yes	Timken	6660	10 25	worm	1 1/2 flo	Ros	BM	Smi	own	own	p-stl	141	144	Larrabee	L-4
L.	d-d	B-L	55	1	no	yes	Timken	6660	8 75	worm	flo	Ros	BM	Day	own	P&B	p-stl			Maccar	M-A
L.	d-d	B-L	50	1	no	yes	Timken	6660	7 75	worm	flo	Ros	BL	Day	own	P&B	p-stl	132	141	Maccar	H-2
L.	pl	own	AC	4	yes	yes	own	A-C	8 49	ch	1 1/2 flo	own	BL	opt	own	own	p-stl			Mack	AC
Her.	d-d	Fuller	GU-7	4	no	yes	Shl	W-21	8 75	worm	1 1/2 flo	Ros	BL	Dom	own	own	r-stl			Mapleleaf	BB
L.	d-d	Fuller	GU-7	4	no	yes	Shl	W-31	10 25	worm	1 1/2 flo	Ros	BM	Dom	own	own	p-stl			Mapleleaf	CC
L.	d-d	B-L	60	4	no	yes	Timken	6660	10 33	worm	1 1/2 flo	Ros	BM	Smi	own	P&B	p-stl			Master	A
L.	d-d	B-L	60	4	no	yes	Timken	6660	10 41	worm	1 1/2 flo	Ros	BL	Cl. Wal	own	own	p-stl			Master	E
L.	d-d	Cotta	R	1	no	yes	Timken	6660	10 33	worm	flo	Ros	BM	Smi	own	own	p-stl	148 1/2	160	Menominee	G
L.	d-d	own		1	no	yes	Timken			worm	1 1/2 flo	Ros		Smi	own	own	p-stl	161 1/2	168	Moreland	22H
Her.	d-d	War.	T53	1	no	yes	Shl	W30	8 75	worm	1 1/2 flo	Lav	E	Bim	own	own	p-stl			Noble	E70
L.	d-d	Fuller	G-7	4	no	yes	Timken	6652	10 1/2	worm	flo	Ros	GM	Smi	own	own	p-stl			Oneida	D
L.	d-d	own		4	no	no	Timken	6660	9	worm	flo	own		Smi	own	own	p-stl	141	222	Packard	ED
L.	d-d	B-L	50	1	no	no	Timken	6660	10 33	worm	flo	Ros	BM	own	MI	Hed	p-stl	144	168	Paige	51-18
L.	d-d	Cvt	RA-4	4	no	yes	Wes	900-C	9 1/2	worm	1 1/2 flo	Ros		Rim	own	Detroit	p-stl	150	156	Patriot	Washington
L.	d-d	own		1	no	yes	own		8	worm	1 1/2 flo	Ros		Day	own	Parish	p-stl	134 1/2		Pierce Arrow	W-n

# Buyer's Specifications of Nationally Distributed

MAKE AND MODEL	CHASSIS				TIRES				ENGINE										ELECTRICAL EQUIPMENT							
	Tons Capacity	Price	Stock Closed Cab	Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. Hp.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Fuel Feed	Governor Make	Truck M. P. H.	IGNITION		START-ING		LIGHT-ING	
					Front	Rear	Front	Rear								Make	Size				Current Source	Make	Make	Extra Cost	Make	Extra Cost
Power Rainier Sanford	C 15 1/2	4,400		160	66	66	36x5 1/2	36x10 1/2	Hin.	4	4 1/2 x 5 1/2	32 4	ft.	pu	hol. erk. Zenith.	1 1/2	vac.	Hin.	14 5	mag.	Eism.	West.	no	West.	no	
	R-15 3/4	4,400		170	66 1/2	65 1/2	36x5	36x5d	Cont.	4	4 1/2 x 5 1/2	32 4	ft.	pu	hol. erk. Zenith.	1 1/2	vac.	Pier.	15	mag.	Eism.					
	135 3/4	4,200		174	62	66	36x5	36x5d	Cont.	4	4 1/2 x 5 1/2	32 4	ft.	pu	cir-spl. Stmbg.	1 1/2	grv.	Pier.	13	mag.	Eism.					
Schacht	F 3	3,800		168	65	56	36x5	36x5d	Bud.	4	4 1/2 x 5 1/2	28 9	ft.	pu	hol. erk. Shb.	1 1/2	grv.	Dup.	15	mag.	Bos.			West.	no	
Schacht	E 4	4,200		168	67	58	36x5	36x5d	Bud.	4	4 1/2 x 5 1/2	32 4	ft.	pu	hol. erk. Shb.	1 1/2	grv.	Dup.	20	mag.	Bos.			West.	no	
Schwartz	C2W 3	3,200		150	58	58	36x4	36x8	Bud.	4	4 1/2 x 5 1/2	28 9	ft.	pu	hol. erk. Stmbg.	1 1/2	grv.	Mon	16	mag.	Bos.			G&D	no	
Selden	3 1/2 A 3 1/2	4,175		162	66 1/2	68	36x5	36x10	Cont.	4	4 1/2 x 5 1/2	32 4	ft.	pu	cir-spl. Stmbg.	1 1/2	grv.	Pier.	14	mag.	Eism.	West.	no	N.E.	no	
Service	71 3/4			171	66 1/2	65 1/2	36x5	36x5d	Bud.	4	4 1/2 x 5 1/2	28 9	ft.	pu	hol. erk. Stmbg.	1 1/2	vac.			mag.	Eism.			West.		
Service	76 3/4			171	66 1/2	65 1/2	36x5	36x5d	Bud.	4	4 1/2 x 5 1/2	32 4	ft.	pu	hol. erk. Stmbg.	1 1/2	vac.			mag.	Eism.			West.		
Signal	M 3 1/2	3,847		168	66 1/2	65 1/2	36x5	40x10	Cont.	4	4 1/2 x 5 1/2	32 4	ft.	pu	cir-spl. Stmbg.	1 1/2	grv.	Pier.	12	mag.	Eism.		yes		yes	
Standard	66 4	3,600		160	66 1/2	65 1/2	36x5	36x10	Cont.	4	4 1/2 x 5 1/2	32 4	ft.	pu	cir-spl. Stmbg.	1 1/2	grv.	Mon.	12	mag.	Eism.			West.	no	
Sterling	3 1/2	4,325		162	67	65 1/2	36x5**	40x5d**	own.	4	4 1/2 x 5 1/2	32 4	ft.	pu	cir-spl. Zenith.	1 1/2	vac.	Wau.	14	bat.	Eism.			West.	no	
Stoughton	F 3	3,600		158	66 1/2	68	36x5	36x5d	Her.	4	4 1/2 x 5 1/2	28 9	ft.	pu	hol. erk. Stmbg.	1 1/2	grv.	Dup.	14	mag.	Bos.			West.		
Sullivan	H 3 1/2			156	66 1/2	68	36x5	36x5d	Bud.	4	4 1/2 x 5 1/2	32 4	ft.	pu	hol. erk. Stmbg.	1 1/2	vac.	Pier.	14	mag.	Bos.			West.		
Super Truck	70 3/2	4,300		164	62 1/2	66	36x5	40x5d	Wis.	4	4 1/2 x 5 1/2	28 9	ft.	pu	hol. erk. Zenith.	1 1/2	grv.	Sim.	11 6	mag.	Bos.			West.	no	
Tower	G 3 1/2	4,100		165	66	66	36x5	36x10	Cont.	4	4 1/2 x 5 1/2	32 4	ft.	pu	cir-spl. Stmbg.	1 1/2	grv.	Dup.	12	mag.	Eism.	L-N.	yes	L-N.	yes	
Union	HW 4	4,650		174	63 1/2	63 1/2	36x5	40x12	Wis.	4	4 1/2 x 5 1/2	32 4	ft.	pu	hol. erk. Shb.	1 1/2	grv.	Dup.	13	mag.	Eism.			West.	no	
United	CT 3 1/2			157			36x5	36x5d	Bud.	4	4 1/2 x 5 1/2	28 9	ft.	pu	hol. erk. Stmbg.	1 1/2	grv.	Sim.	15	mag.	Eism.			West.	no	
United States	R 3	3,075		156	59	60	36x4	36x4d	Hin.	4	4 1/2 x 5 1/2	25 6	ft.	pu	pres. Stmbg.	1 1/2	vac.	Hin.	17 3	mag.	Eism.	Bos.		Bos.	yes	
United States	S 4	3,875		168	63 1/2	66	36x5	36x5d	Hin.	4	4 1/2 x 5 1/2	32 4	ft.	pu	pres. Stmbg.	1 1/2	vac.	Hin.	12 5	mag.	Eism.	Bos.		Bos.	yes	
Veteran	H 3 1/2	5,600		156	62	60	36x5	36x10	Bud.	4	4 1/2 x 5 1/2	32 4	ft.	pu	hol. erk. Zenith.	1 1/2	vac.	Sim.	14	mag.	Eism.			West.	no	
Vim	23 3	3,950		175	56	60	36x5	36x5d	Her.	4	4 1/2 x 5 1/2	28 9	ft.	pu	hol. erk. Zenith.	1 1/2	grv.	Dup.	14	mag.	Spl.		yes	West.	no	
White	40 3 1/2	4,200		174	64 1/2	61 1/2	36x5	40x5d	own.	4	4 1/2 x 5 1/2	25 6	ft.	pu	hol. erk. own.	1 1/2	vac.	own.	9	mag.	Eism.	N.E.	yes	N.E.	yes	
Wichita	O 3 1/2	4,000		165	60	66	36x5	36x5d	Wau.	4	4 1/2 x 5 1/2	32 4	ft.	pu	hol. erk. Stmbg.	1 1/2	grv.	Wau.	9	mag.	Eism.			West.	no	
Wilcox Trux	E 3 1/2			162			36x5**	36x5d**	Bud.	4	4 1/2 x 5 1/2	32 4	ft.	pu	hol. erk. Stmbg.	1 1/2	grv.	Dup.		mag.	Eism.	West.	yes	West.	no	
Winther	70 3 1/2	4,200		150	67	70	36x5	36x5d	Wis.	4	4 1/2 x 5 1/2	25 6	ft.	pu	hol. erk. Mas.	1 1/2	vac.		15	mag.	Eism.	West.	yes	West.	no	

RADIATOR TYPE  
1922 - FINNED TUBE  
1921 - FINNED TUBE

S.A.E. HP.  
1922 - 36 1/5  
1921 - 36 1/5

PRICE  
1922 - \$48.44  
1921 - \$51.70

FUEL FEED  
1922 - GRAVITY  
1921 - GRAVITY

GEARSET TYPE (AMIDSHIP)  
1922 - 4 - SPEEDS  
1921 - 4 - SPEEDS

FINAL DRIVE  
1922 - WORM  
1921 - WORM

5-TON

FRAME  
1922 - PRESSE STEEL  
1921 - PRESSE STEEL

CLUTCH TYPE  
1922 - DRY-DISK  
1921 - DRY-DISK

ELECTRIC SYSTEM  
1922 - STARTING & LIGHTING AT EXTRA COST  
1921 - STARTING & LIGHTING AT EXTRA COST

WHEELBASE  
1922 - 107 IN  
1921 - 108 IN

TIRES - FRONT - REAR  
1922 - SOLID - SOLID  
1921 - SOLID - SOLID

SIZE - FRONT - REAR  
1922 - 36 x 6 - 40 x 6d  
1921 - 36 x 6 - 40 x 6d

MAKE AND MODEL	CHASSIS				TIRES				ENGINE										ELECTRICAL EQUIPMENT						
	Tons Capacity	Price	Stock Closed Cab	Standard Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. Hp.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Fuel Feed	Governor Make	Truck M. P. H.	IGNITION		START-ING		LIGH-ING
					Front	Rear	Front	Rear								Make	Size				Current Source	Make	Make	Extra Cost	Make
Acme.....	E 5			180	68	69 1/2	36x6	40x6 1/2	Cont...	4	4 1/2 x 6	36 10	ft.	pu	cir-spl.	Ray...	1 1/2	vac.	Cont...	12 5	mag.	Eism...			Day...
American.....	50 5	\$4,500		174	65	60	36x5	36x5d	Wis...	4	4 1/2 x 6	32 4	ft.	pu	pres.	Stmbg.	1 1/2	grv.	own...	15	mag.	Apo...			West...
Atterbury.....	8E 5	4,975		167 1/2	64	60 1/2	36x5	40x6	Cont...	4	4 1/2 x 6	36 10	ft.	pu	hol. erk.	Zenith.	1 1/2	vac.	Cont...	11	mag.	Eism...			Delco...
Autocar.....	26-B 5	4,100		156	63	65	34x6	36x12	own...	4	4 1/2 x 6	28 9	ft.	pu	cir-spl.	Stmbg.	1 1/2	grv.	Phar...		mag.				
Autocar.....	26-Y 5			120	63	65	34x6	36x12	own...	4	4 1/2 x 6	36 10	ft.	pu	cir-spl.	Stmbg.	1 1/2	grv.	Phar...		mag.				
Available.....	H 5	5,375		190	68	66	36x6	40x12	Her...	4	4 1/2 x 6	40 0	ft.	pu	hol. erk.	Stmbg.	1 1/2	vac.	Pier...	12	mag.	Bos...	Bos...	yes	Bos...
Brockway.....	T 4 5			174	68	69	36x6	40x6d	Cont...	4	4 1/2 x 6	36 1	ft.	pu	hol. erk.	Stmbg.	1 1/2	vac.	Cont...	14	mag.	Eism...	N.E...	yes	N.E...
Clydesdale.....	120B 5	4,500		176	68 1/2	69	36x6	40x6d	Cont...	4	4 1/2 x 6	36 10	ft.	pu	hol. erk.	Stmbg.	1 1/2	vac.	own...	14	mag.	Eism...	West...	yes	West...
Corbitt.....	AA-22 5	4,500		178	66	70	36x6	40x6d	Cont...	4	4 1/2 x 6	36 10	ft.	pu	hol. erk.	Stmbg.	1 1/2	vac.	Cont...	12	mag.	Eism...			Eism...
Day Elder.....	E 5	4,250		162	67	70	36x5	36x5d	Bud...	4	4 1/2 x 5 1/2	32 4	ft.	pu	hol. erk.	Zenith.	1 1/2	grv.	Mon...	10	mag.	Eism...			Eism...





# Buyer's Specifications of Nationally Distributed

MAKE AND MODEL		CHASSIS		TIRES		ENGINE												ELECTRICAL EQUIPMENT										
		Tons Capacity	Price	Stock Closed Cab	WHEELBASE, INCHES		TREAD		SIZE		MAKE	NUMBER OF CYLINDERS	BORE AND STROKE	S. A. E. HP.	RADIATOR TYPE	WATER CIRCULATION	OILING SYSTEM	CARBU-RETER		FUEL FEED	GOVERNOR MAKE	TRUCK M. P. H.	IGNITION		START-ING		LIGHT-ING	
					Standard	Wheelbase,	Front	Rear	Front	Rear								Make	Size				Make	Size	Current Source	Make	Make	Extra Cost
Denby	210 5	4,500		170	65	69 1/2	36x6	40x12	Cont.	4	4 1/2 x 5 1/2	32.4 ft	pu	cir-spl.	Stmbg.	1 1/2 grv	Dup.	32 4	mag	Eism.								
Diamond-T	EL 5	4,325		180	68 1/2	69 1/2	36x6	40x6d	Hin	4	4 1/2 x 5 1/2	32.4 ft	pu	hol. crk.	Stmbg.	1 1/2 vac	Hin	12	mag	Bos	West.	yes	Bos	yes				
Diamond-T	S 5	4,300		180	68 1/2	69 1/2	36x6	40x6d	Lib.	4	4 1/2 x 5 1/2	36.10 ft	pu	hol. crk.	Stmbg.	1 1/2 vac		12	mag	Bos	West.	yes	Bos	yes				
Federal	X-2 5	4,500		163	66 1/2	69 1/2	36x6	40x6d	Cont.	4	4 1/2 x 6	36.10 ft	pu	hol. crk.	Zenith.	1 1/2 vac	Phar.	12	mag	Eism.			Au-L.	no				
G. M. C.	K-101 5	4,350		167	67	69 1/2	36x5	40x6d	own	4	4 1/2 x 6	32.4 ft	pu	hol. crk.	Mar.	1 1/2 grv	own	15	mag	Eism.	Remy.	no	Remy.	no				
Gary	M 5	6,200		182	63 1/2	69 1/2	36x6	40x6d	Bud	4	5 1/2 x 6 1/2	48.4 ft	pu	hol. crk.	Mas.	1 1/2 vac	McC.	10	mag	Eism.			Eism.	yes				
Hall	5	5,100		144	66	72	36x5	40x6d	Cont.	4	4 1/2 x 5 1/2	32.4 ft	pu	cir-spl.	Zenith.	1 1/2 grv	Dup.	15	mag	Es, Bs.			Eism.	yes				
Hall	5	5,100		144	66	72	36x5	40x6d	Cont.	4	4 1/2 x 5 1/2	32.4 ft	pu	cir-spl.	Zenith.	1 1/2 grv	Dup.	15	mag	Es, Bs.			Eism.	yes				
Indiana	51 5	5,100		170	65	73 1/2	36x5	40x6d	Wau	4	5 1/2 x 6 1/2	40 ft	pu	hol. crk.	Stmbg.	1 1/2 grv	Wau.	12	mag	Eism.	West.		West.					
International	101 5	3,600		160	62	64 1/2	36x5	40x10	own	4	4 1/2 x 5	28.9 ft	pu	cir-spl.	Ens.	1 1/2 grv	own	14	mag	Eism.	Dix		N.E.					
Kalamazoo	K-5 5	4,500		160	62	74 1/2	36x6	36x6d	Wis	4	4 1/2 x 6	32.4 ft	pu	hol. crk.	Stmbg.	1 1/2 vac	Pier	12	mag	Bos	Dyn.	yes	Dyn.	yes				
Kimball	AF 5	5,300		164	62	74 1/2	36x6	40x7d	Wis	4	4 1/2 x 6	40 pt	pu	hol. crk.	Zenith.	1 1/2 vac	Sim	12	mag	Spl.	West.		West.					
Kleiber	5	5,300		180	68 1/2	69 1/2	36x6	40x12	Bud	4	5 1/2 x 6 1/2	40 ft	pu	hol. crk.	Stmbg.	1 1/2 grv	Sim	10	mag	Eism.			West.					
Larrabee	W 5	4,800		185	68	73	36x6	40x6d	Cont.	4	4 1/2 x 5	36.1 ft	pu	hol. crk.	Zenith.	1 1/2 grv	Phar.	10	mag	Bos			Bos					
Maccar	G 5	4,950		186	68 1/2	69 1/2	36x5	40x6d	Cont.	4	4 1/2 x 6	36.1 ft	pu	hol. crk.	Zenith.	1 1/2 grv	Mue	13.5	mag	Eism.	Bos		Bos					
MacDonald	A 7	5,750		180	68 1/2	71 1/2	40x7	40x14	Sim	4	4 1/2 x 6	32.4 pt	pu	hol. crk.	Stmbg.	1 1/2 grv	own	10	mag	Eism.			yes					
Mack	A B Trac 5	3,400		120	58 1/2	62 1/2	36x4	36x4d	own	4	4 x 5	25.6 cel	pu	cir-spl.	Shb.	1 1/2 grv	own	12.94	mag	Tea	L-N	yes	L-N	yes				
Mack	AC 5	5,500		168	68 1/2	74 1/2	36x6	40x6d	own	4	4 x 6	40 pt	pu	cir-spl.	Shb.	1 1/2 grv	own	13.22	mag	Tea	L-N	yes	L-N	yes				
Mack	AC 5	5,750		168	68 1/2	74 1/2	36x6	40x12	own	4	4 x 6	40 pt	pu	cir-spl.	Shb.	1 1/2 grv	own	11.35	mag	L-N	L-N	yes	L-N	yes				
Mack	AC Trac 7	4,950		119	68 1/2	71 1/2	36x5	40x5d	own	4	4 x 6	40 pt	pu	cir-spl.	Shb.	1 1/2 grv	own	11.11	mag	Tea	L-N	yes	L-N	yes				
Mack	AC 7 1/2	6,000		168	68 1/2	74 1/2	36x7	40x7d	own	4	4 x 6	40 pt	pu	cir-spl.	Shb.	1 1/2 grv	own	10.30	mag	L-N	L-N	yes	L-N	yes				
Mack	AC Trac 10	5,500		119	68 1/2	74 1/2	36x6	40x6d	own	4	4 x 6	40 pt	pu	cir-spl.	Shb.	1 1/2 grv	own	10.30	mag	Tea	L-N	yes	L-N	yes				
Mack	AC Trac 13	5,750		119	68 1/2	74 1/2	36x6	40x12	own	4	4 x 6	40 pt	pu	cir-spl.	Shb.	1 1/2 grv	own	9.23	mag	L-N	L-N	yes	L-N	yes				
Mack	AC Trac 15	6,000		119	65 1/2	76 1/2	36x7	40x7d	own	4	4 x 6	40 pt	pu	cir-spl.	Shb.	1 1/2 grv	own	8.45	mag	L-N	L-N	yes	L-N	yes				
Mapleleaf	DD 5	6,490		160	62	73 1/2	36x6	40x6d	Hin	4	4 1/2 x 5 1/2	32.4 ft	pu	hol. crk.	Stmbg.	1 1/2 vac	Hin	11	mag	Eism.	West.	yes	West.	yes				
Master	B 5	5,290		170	62	73 1/2	36x6	40x6d	Bud	4	4 1/2 x 5 1/2	36.1 ft	pu	hol. crk.	own	1 1/2 vac	Pier	9.4	mag	Eism.	West.	yes	West.	yes				
Master	F 5	5,440		170	68 1/2	67 1/2	36x6	40x6d	Bud	4	4 1/2 x 6	36.1 ft	pu	hol. crk.	own	1 1/2 vac	Pier	9.5	mag	Eism.	Bos		Bos	no				
Menominee	J-3 5	5,450		160	68 1/2	71 1/2	36x6	40x12	Wis	4	4 1/2 x 6	36.1 ft	pu	hol. crk.	Stmbg.	1 1/2 grv	Hin	11	mag	Bos	West.	no	West.	no				
Oneida	E 5	4,725		180	68 1/2	69 1/2	36x5	40x12	Hin	4	4 1/2 x 5 1/2	32.4 cel	pu	hol. crk.	Stmbg.	1 1/2 vac	Hin	11	mag	Bos	West.	no	West.	no				
Packard	EF 5	4,500		156	69 1/2	69 1/2	36x6	40x6d	own	4	5 1/2 x 5 1/2	40 ft	pu	cir-spl.	own	1 1/2 pres.	own	11	mag	Dix	Bijur.	yes	Bijur.	yes				
Pierce Arrow	R-10 5	4,850		168	68 1/2	68 1/2	36x5	40x6d	own	4	4 1/2 x 6 1/2	32.4 ft	pu	hol. crk.	Stmbg.	1 1/2 pres.	own	14	bat.	Delco	Delco	yes	Delco	yes				
Rainier	R-17 5	5,100		172 1/2	66 1/2	69 1/2	36x6	40x6d	Cont.	4	4 1/2 x 6	36.1 ft	pu	hol. crk.	Zenith.	1 1/2 vac	Pier	15	mag	Eism.								
Sanford	150 5	5,100		174	62	74	36x5	36x6d	Cont.	4	4 1/2 x 5 1/2	32.4 ft	pu	cir-spl.	Stmbg.	2 grv	Pier	11	mag	Eism.								
Schacht	E 5	4,400		168	67	59	36x6	4x12	Bud	4	4 1/2 x 6	32.4 ft	pu	cir-spl.	Shb.	1 1/2 grv	own	15	mag	Bos			West.					
Schwartz	DW 5	4,500		170	64 1/2	73 1/2	36x6	36x12	Bud	4	4 1/2 x 6	32.4 cel	pu	hol. crk.	Stmbg.	1 1/2 grv	Sim	14	mag	Bos			G&D	no				
Selden	5-A 5	5,600		164	68 1/2	69 1/2	36x5	40x12	Cont.	4	4 1/2 x 6	36.1 ft	pu	hol. crk.	Stmbg.	1 1/2 grv	Cont.	13	mag	Eism.	N.E.	yes	N.E.	yes				
Service	101 5	5,600		171 1/2	68 1/2	69 1/2	36x6	40x6d	Bud	4	4 1/2 x 6	32.4 ft	pu	hol. crk.	Stmbg.	1 1/2 vac	own	12	mag	Eism.	West.		West.					
Signal	R 5	4,770		180	68 1/2	69 1/2	36x6	40x12	Cont.	4	4 1/2 x 6	36.1 ft	pu	cir-spl.	Stmbg.	1 1/2 grv	Cont.	12	mag	Eism.			West.					
Sterling	5K 5 1/2	4,400		164	68 1/2	69 1/2	36x6	40x12	Cont.	4	4 1/2 x 6	36.1 ft	pu	cir-spl.	Stmbg.	1 1/2 vac	Cont.	10	mag	Eism.								
Sterling	5	4,950		168	71 1/2	69 1/2	36x6	40x6d	own	4	4 1/2 x 6	40 cel	pu	cir-spl.	Zenith.	1 1/2 vac	Wau.	14	mag	Eism.								
Sterling	5	5,500		174	71 1/2	75 1/2	36x6	40x5d	own	4	4 1/2 x 6 1/2	40 cel	pu	cir-spl.		1 1/2 vac	Wau.	18	bat.	Eism.								
Sterling	7 1/2	6,000		174	71 1/2	78 1/2	36x6	40x7d	own	4	4 1/2 x 6 1/2	40 pt	pu	cir-spl.	Zenith.	1 1/2 vac	Wau.	16 1/2	bat.	Eism.								
Super Truck	100 5	3,300		164	62 1/2	74 1/2	36x5	40x12	Wis	4	4 1/2 x 6	36.1 ft	pu	hol. crk.	Zenith.	1 1/2 vac	Sim	11.60	mag	Eism.								
Union	JW 6	5,800		167	65	69 1/2	36x6	40x14	Wis	4	4 1/2 x 6	40 cel	pu	hol. crk.	King	1 1/2 grv	Dup	12.5	mag	Eism.	L-N	yes	L-N	yes				
United States	T 6	4,850		172	64 1/2	73 1/2	36x6	40x6d	Bud	4	4 1/2 x 6 1/2	36.1 ft	pu	pres.	Stmbg.	1 1/2 vac	Sim	11	mg. bt.	Eism.	Bos		Bos					
White	45 5	4,500		174	64 1/2	65 1/2	36x6	40x6d	own	4	4 1/2 x 5 1/2	28.9 ft	pu	hol. crk.	own	1 1/2 vac	own	8 1/2	mag	Eism.	N.E.	yes	N.E.	yes				
Wichita	S 5	5,000		165	64 1/2	70	36x6	40x6d	Wau	4	4 1/2 x 6	32.4 cel	pu	hol. crk.	Stmbg.	1 1/2 grv	Wau.	8 1/2	mag	Eism.	N.E.	yes	N.E.	yes				
Wilcox	F 5	5,250		162	69	65	36x5	40x12	Bud	4	4 1/2 x 6	36.1 ft	pu	cir-spl.	Stmbg.	1 1/2 grv	Dup	12	mag	Eism.	West.	yes	West.	yes				
Winther	109 5	5,250		162	69	65	36x6	40x6d	Wis	4	4 1/2 x 6	32.4 pt	pu	hol. crk.	Mas.	1 1/2 vac	Dup	10	mag	Eism.	West.	yes	West.	yes				
Winther	140 5	5,900		162	69	65	36x6	40x7d	Wis	4	4 1/2 x 6	40 pt	pu	hol. crk.	Mas.	1 1/2 vac	Dup	10	mag	Eism.	West.	yes	West.	yes				

## ABBREVIATIONS—Types of Construction

- \*—Tires optional
- \*\*—Pneumatics extra
- \*\*\*—Pneumatics and cushions extra. Price includes body—f
- bat—storage battery
- b-s—bevel spur
- c—cone
- cel—cellular
- ch—chain
- cir-spl—circulating splash
- est-s—cast steel
- cu—cushion
- d-d—dry disk
- d-o—disk in oil
- d-pl—dry plate
- flo—floating
- 1/2 flo—semi-floating
- f-t—fin tube
- grv—gravity
- h-c—hollow crankshaft
- i—internal gear
- mag—magneto
- opt—optional
- p—pneumatic
- pl—plate
- pres—pressure
- p-stl—pressed steel
- p-t—plain tube
- pu—pump
- r-s—rolled section
- s-b—spiral bevel
- st-b—straight bevel
- t—thermosiphon
- vac—vacuum
- wa—wood artillery
- wd—wood disk
- wor—worm

## ABBREVIATIONS—Makers of Parts

- A-K—Atwater Kent
- Apo—Apollo
- Are—Arelabaid
- Aul—Auto Lite
- Aw—Auto Wheel
- B&B—Borg & Beck
- Bij—Bijur
- Bim—Bimel
- Ben—Bendix
- Ber—Beiling
- B-L—Brown Lape
- Bos—Bosch
- Bud—Buda
- Car—Carter
- CAS—CAS Products
- Cent—Central
- Cl—Clark
- Col—Columbia
- Cont—Continental
- Conn—Connecticut
- Cot—Cotta
- Cvt—Covert
- Day—Dayton
- Del—Delco
- Dela—Delaney
- Det—Detroit
- Dit—Ditwiler
- Dix—Dixie
- Dtl—Detlaff
- Dun—Dundore
- Dup—Duplex
- Dur—Durston
- Dyn—Dyneto
- Eat—Eaton
- Eism—Eisemann
- Ens—Ensign
- E & O—Eberly & Oris
- Ful—Fulcr



# Gasoline Trucks on 1922 Market—Concluded

TRANSMISSION SYSTEM														STEERING GEAR		WHEELS		FRAME		MAKE AND MODEL		
CLUTCH		GEARSET		POWER TAKE-OFF			REAR AXLE					Live Axle Type	Make	Model	Make	Type	Make	Material	Length from Cab to Rear			Maximum Body Length Recommended
Make	Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive	Make											
n	d-d.	Warner	T-53	4	no	yes	Cl.	5-D	12.55	1	flo	Ros.	BM.	Cl.	cs&s	Detroit.	p-stl	140	170	Denby	210	
rt L	d-d.	Cvt.	SA-4	4	no	yes	Timken.	6760	11.66	worm.	flo	Gem.	R.	Smi.	cs&s	Smi.	p-stl.			Diamond-T	EL	
KB	d-d.	B-L.	60	4	no	yes	Timken.	6760	11.66	worm.	flo	Gem.	R.	Smi.	cs&s	Smi.	p-stl.			Diamond-T	S	
	d-d.	Warner.		4	no	yes	Timken.	6760	10.25	worm.	flo	Gem.		Smi.	cs&s	Detroit.	p-stl.			Federal	X-2	
n	d-d.	own.		7	no.	yes.	Timken.		10	worm.	flo	own.		own.	cs&s.	Smi.	p-stl	144	168	G. M. C.	K-101	
L	d-d.	B-L.	60	4	yes.	yes.	Timken.		11.7	worm.	flo	Ros.	BM.	own.	cs&s.	own.	p-stl			Gary	M	
L	d-d.	B-L.	50-4	4	no	yes	Timken.	6760	15	worm.	flo	Gem.		Smi.	cs&s.	own.	r-stl.	144	141	Hall		
L	d-d.	B-L.	60	4	no	yes.	Timken.		14.7	ch.	flo	Gem.		Smi.	cs&s.	own.	r-stl.	144	144	Hall		
KB	pl.	B-L.		4	no	yes.	Shl	W-51	10.25	worm.	flo	Woh	5	Smi.	cs&s.	own.	r-stl.	150	156	Indiana	51	
	d-d.	B-L.	60	4	no	yes.	own.		11	i	flo.	own.		own.	wa	P&B.	p-stl.	147	150	International	101	
ler	d-d.	Fuller.	H-7	4	no	yes	Shl	W-51	13	worm.	flo	Ros.	BM.	Smi.	cs&s	own.	r-stl.	151	168	Kalamazoo	K-5	
L	d-d.	B-L.		4	no	no	Shl	W-21	8.75	worm.	flo	Woh.		Smi.	cs&s	P&B.	p-stl.	148		Kimball	AF	
L	d-d.	B-L.	60	4	no	no	Timken.	6760	11.66	worm.	flo	Ros.	BM.	Smi.	cs&s	own.	r-stl.	168	180	Kleiber		
L	d-d.	B-L.	60	4	no	yes	Shl	W-51	10.25	worm.	flo	Ros.	BM.	Smi.	cs&s	Lav.	p-stl.	152	168	Larrabee	W	
L	d-d.	B-L.		4	no	yes	Timken.	6760	10.25	worm.	flo	Ros.	BM.	Smi.	cs&s	Parish	p-stl.					
L	d-d.	B-L.		4	no	yes.	own.		17.5	opt.	flo	own.		own.	cs&s.	own.	opt.	opt.	opt.	Maccar	G	
n	d-d.	own.	AB	4	yes.	yes.	own.	AB.	10.53	ch.	flo	own.	AB	opt.	opt.	own.	p-stl.	opt.	opt.	MacDonald	A	
	d-pl.	own.		3	yes.	yes.	own.	AC	9	ch.	flo	own.	AC	opt.	opt.	own.	p-stl.	156	168	Mack	A B Trac	
	d-pl.	own.	AC	3	yes.	yes.	own.	AC	10.5	ch.	flo.	own.	AC	opt.	opt.	own.	p-stl.	156	168	Mack	AC	
	d-pl.	own.	AC	3	yes.	yes.	own.	AC	10.76	ch.	flo.	own.	AC	opt.	opt.	own.	p-stl.	87		Mack	AC	
	d-pl.	own.	AC	3	yes.	yes	own.	AC	11.58	ch.	flo.	own.	AC	opt.	opt.	own.	p-stl.	156	168	Mack	AC	
	d-pl.	own.	AC	3	yes.	yes	own.	AC	11.58	ch.	flo.	own.	AC	opt.	opt.	own.	p-stl.	87		Mack	AC	
	d-pl.	own.	AC	3	yes.	yes	own.	AC	12.93	ch.	flo.	own.	AC	opt.	opt.	own.	p-stl.	87		Mack	AC	
	d-d.	own.	AC	3	yes	yes.	own.	AC	14.1	ch	flo.	own.	AC	opt.	opt.	own.	p-stl.			Mack	AC	
ler.	d-d.	Fuller.	H	4	no	yes.	Shl	W-51	13	worm.	flo	Ros.	BM.	Smi.	cs&s	own.	p-stl.	87		Mapleleaf	DD	
L	d-d.	B-L.	60	4	no	yes.	Timken.	6760	11.66	worm.	flo.	Ros.	BM.	Smi.	cs&s	P&B.	p-stl.			Master	F	
	d-d.	B-L.	60	4	no	yes.	Wal.	5A	11.53	i	flo	Ros.	BM.	Wal,Cl.	cs&s	P&B.	p-stl.					
ler.	d-d.	Cotta	S	4	no	yes.	Timken.	6760	11.66	worm.	flo	Ros.	BM.	Smi.	cs&s	own.	r-stl.					
	d-d.	Fuller.	H-1	4	no	yes.	Timken.	6752	11.66	worm.	flo	Ros.	BM.	Smi.	cs&s	own.	p-stl.	149	168	Master	J-3	
	d-d.	own.	EF	4	no	no	own.	EF	10.66	worm.	flo	Ros.		own.	opt.	own.	r-stl.	144	222	Menominee	E	
	d-d.	own.		4	no	yes	own.		10	worm.	flo	Ros.		Day	cs&s.	Parish	p-stl.	130		Oneida		
	d-d.	B-L.	60	4	no	no	Timken.	6760	13.66	worm.	flo	Ros.	BM.	Smi.	cs&s.	Parish	p-stl.	154		Packard	EF	
B.	d-d.	B-L.		4	no	yes.	Shl		4.6	worm.	flo.	Ros.		Smi.	cs&s	P&B.	p-stl.	145	144	Pierce Arrow	R-10	
ler.	d-d.	own.		8	no	yes	own.		14	worm.	flo	own.		Smi.	cs&s.	own.	r-stl.	152	156	Rainier	R-17	
	d-d.	Fuller	H	4	no	yes.	Shl	W-31	10.25	worm.	flo	Ros.	BM.	Smi.	cs&s.	Parish	p-stl.	161	174	Sanford	150	
	d-d.	B-L.		4	no	yes.	Shl			worm.	flo.	Ros.		Smi.	cs&s	own.	p-stl.	152	156	Schacht	E	
B.	d-d.	B-L.		4	no	yes	Shl	W-31	10.25	worm.	flo	Ros.	BM.	Smi.	cs&s.	own.	p-stl.	161	174	Schwartz	DW	
	d-d.	B-L.		4	no	yes	Timken.			worm.	flo.	Gem.		Sta.	cs&s	own	p-stl.	153	156	Selden	5-A	
B.	pl.	B-L.	60	4	no	no	Timken.	6760	10.25	worm.	flo.	Ros.	BM	Sta	cs&s	Sav.	r-stl.	165		Service	101	
	d-d.	B-L.	60	4	no	yes	Timken.		11.66	worm.	flo.	Ros.		Smi.	cs&s	own.	p-stl.			Signal	R	
	d-d.	B-L.	60	4	no	no	Timken.	6860	11.33	worm.	flo.	Gem.	R.	Prud	cs&s	own.	p-stl.	144	144	Standard	5K	
s.	d-o.	own		3	no	yes.	Timken.	6760	8.8	worm.	flo	Ros.	BM.	Smi.	cs&s	own.	p-stl.	144	216	Sterling		
s.	d-o.	own		6	no	yes.	own.		7.04	ch	flo	Ros.	BM.	Smi.	cs&s.	own.	p-stl.	120	216	Sterling		
s.	d-o.	own.		6	no	yes.	own.		7.04	ch	flo	Ros.	BM.	Smi.	cs&s	own.	p-stl.	120	216	Sterling		
er.	d-d.	Fuller.	H	4	no	yes.	Shl.	W-51	10.75	worm.	flo	Ros.	BM.	Smi.	cs&s	P&B	p-stl.	120	216	Super Truck	100	
er.	d-d.	Fuller.	H	4	no	yes.	Wal.	7A	10.5	bs.	flo	Ros.	BM.	Smi.	cs&s.	own.	p-stl.	120	216	Union	JW	
	d-d.	B-L.	60	4	no	yes.	Shl.	W-51	10.25	worm.	flo	Lav.	E	Smi.	cs&s.	own.	p-stl.	168	174	United States	T	
	pl.	own		4	no	yes	own.			bs.	flo	own.		own.	cs&s.	own.	r-stl.	164		White	45	
c	Sav.	DR-60		4	no	no	Sav.		14	bs.	flo	Ros.	BM.	own.	cs&s.	own.	p-stl.	164	180	Wichita	S	
E.	d-d.	own.	E	4	no	no	Wal.			worm.	flo	own.		Smi.	cs&s	Smi.	p-stl.	148	182	Winlox	F	
pl	B-L.	60		4	no	yes.	Cl.	5D	12.5	i	flo	Ros.	BM.	Cl.	cs&s.	own.	r-stl.	154	156	Winther	109	
3	B-L.	60		4	no	yes.	Cl.	5D	12.5	i	flo	Ros.	BM.	Cl.	cs&s.	own.	r-stl.	154	156	Winther	140	

## ABBREVIATIONS—Makers of Parts—(Con)—

GBS—Golden, Belknap & Swartz  
 GD—Gray & Davis  
 Gem—Gemmer  
 GrL—Grant-Lees  
 Hay—Haynes  
 Hls—Hele Shaw  
 Her—Hercules  
 Hin—Hinkley  
 Hoo—Hoopes Bros.  
 Hrt—Hartford  
 HS—Herschell-Spillerman  
 Ind—Indestructible  
 IrM—Iron Mountain  
 Jac—Jacox  
 John—Johnson  
 Jon—Jones  
 Kel—Kelsey  
 Kng—Kingston  
 KW—KW Ignition Co.

Lav—Lavine  
 LeR—LeRoi  
 Lib—Liberty  
 L-N—Leece Neville  
 Lyc—Lycoming  
 Mar—Marvel  
 Mas—Master  
 McC—McCanna  
 M&E—Merchant & Evans  
 Mid—Midwest  
 Mon—Monarch  
 Mue—Mueller  
 Mun—Muncie  
 MWC—Motor Wheel Corp.  
 NE—North East  
 Nor—Northway  
 P&B—Parish & Bingham  
 Phar—Pharo  
 Pier—Pierce

Prud—Prudden  
 Ray—Rayfield  
 Rny—Remy  
 Ros—Rose  
 Roy—Royer  
 Ros—Ross  
 Russ—Russell  
 Sag—Saginaw Products Co.  
 Sal—Salisbury  
 Sav—Savage  
 Sch—Schwartz  
 Shb—Shobler  
 Shl—Sheldon  
 Sim—Simplex  
 Smi—Smith  
 Spl—Spitdorf  
 Stan—Standard Parts Co.

Sta—Standard  
 StM—St. Mary  
 Strmbg—Stramberg  
 Stw—Stewart  
 Ten—Tench  
 Thom—Thompson  
 Til—Tillotson  
 Tim—Timber  
 Uni—Universal  
 Ves—Ves  
 Wal—Walker  
 Wan—Wayne  
 War—Warner Corp.  
 Wai—Wainwright  
 Wes—Western White Co.  
 Wis—Wisconsin  
 Woh—Wohlgemuth  
 Wst—Wetzel  
 Zen—Zenith

# Buyer's Specifications of Electric Motor

MAKE AND MODEL	Load Capacity in Tons	PRICE OF CHASSIS		Wheel-base in Inches	TIRES		Max. Body Length Recommended	Distance from Ground to Top of Frame	Location	Make and Type	PRICE	BATTERY				
		With Battery	Without Battery		Kind	SIZES IN INCHES						No. Plates	No. Cells	No. Trays	Amp. Hr. Capacity	
						Front										Rear
C. T. BR2-A	1		\$1,975	91	solid & pneu.	36x3	36x3½	90	amid-u.	Excide, Ironclad*	\$710*	9*	42*	5*	136*	
C. T. BR2	1		2,150	101	solid*	36x3	36x4	102	amid-u.	Excide, Ironclad*	835*	11*	42*	5*	170*	
C. T. BR-4	2		2,575	116	solid*	36x4	36x4d	138	amid-u.	Excide, Ironclad*	1,110*	15*	42*	6*	238*	
C. T. AR-7	3		3,550	126	solid*	36x5	36x5d	156	amid-u.	Excide, Ironclad*	1,350*	19*	42*	6*	306*	
C. T. AK-7	3		3,850	122	solid*	36x6	36x4d	156	amid-u.	Excide, Ironclad*	1,350*	19*	42*	6*	306*	
C. T. AK-10	5		3,960	132	solid*	36x7	36x4d	174	amid-u.	Excide, Ironclad*	1,480*	21*	42*	9*	340*	
Couple Gear H-2	2			144	solid...	34x4	36x6		amid-u.			21	44		252	
Couple Gear A-4	4			144	solid...	36x5	36x7		amid-u.			25	44		324	
Couple Gear LD-6	6			144	solid...	36x6	40x7		amid-u.			31	44		384	
Lansden M	1		1,850	108	solid...	36x3	36x3½	124	amid-u.	Excide, Ironclad*		11*	44*	10*	170*	
Lansden M	1		2,250	121	solid...	36x4	36x3d	168	amid-u.	Excide, Ironclad*		15*	44*	6*	238*	
Lansden M	1		2,950	133	solid...	36x5	36x4d	180	amid-u.	Excide, Ironclad*		17*	44*	6*	272*	
Lansden M	5		3,350	146	solid...	36x6	36x5d	204	amid-u.	Excide, Ironclad		19*	44*	6*	306*	
Lansden G	1		1,400	96	pneu...	32x4½	32x4	84	amid-u.	Excide, Ironclad		9*	44*	4*	136*	
Tec 1102				65	solid...	20x5	20x5		amid-u.	Ironclad*		17	34	5	134	
TEC 1202				91	solid...	20x5	20x5		amid-u.	Opt.....						
Walker M	1		2,000	94	solid...	34x3	36x4	opt	amid-u.							
Walker K	1		2,175	96	solid...	34x3½	36x4	opt	amid-u.							
Walker L	2		2,650	112	solid...	38x4	38x6	opt	amid-u.							
Walker P	2		3,750	131	solid...	36x5	36x5d	opt	amid-u.							
Walker N	5		3,950	141	solid...	36x6	38x6d	opt	amid-u.							
Ward WS-2	1			88	solid...	32x3	32x3½		amid-o.	Opt.						
Ward WA-2	1			90	solid...	32x3½	34x4		amid-o.	Opt.						
Ward WA	1			90	solid...	32x3½	34x4		amid-o.	Opt.						
Ward WB	1			102	solid...	34x4	36x5		amid-o.	Opt.						
Ward WM	1-1½			88	solid...	32x3	32x4		amid-o.	Opt.						
Ward WD	2			114	solid...	36x5	36x7		amid-u.	Opt.						
Ward WF	3			132	solid...	36x6	36x10		amid-u.	Opt.						
Ward WH	5			146	solid...	36x7	40x12		amid-u.	Opt.						

## ABBREVIATIONS—Types of Construction and Parts Makers

\*with other options  
 amid—amidships  
 amid-o amidships, over frame  
 amid-u amidships, underslung below frame

a-plat—aluminum platform  
 b-w-seats between seats  
 cent—center  
 chassis-f—in chassis front

d—dual  
 front-e front center  
 front-o over frame at front  
 front-u in front under frame  
 Her-gear Herringbone gears  
 l-seat—to left of seat

lever-l—lever left  
 lever-r—lever right  
 l-vert—left vertical  
 pedal-l pedal to left of operator  
 rnd-rd radius rods  
 rear-o at rear, over frame

# Buyer's Specifications of Nationally Distributed Gasoline Trucks

MAKE AND MODEL		CHASSIS				TIRES		ENGINE										ELECTRICAL EQUIPMENT						
		Tons Capacity	Price	Stock Closed Cab	Wheelbase, Inches	TREAD		SIZE		Make	Number of Cylinders	Bore and Stroke	S. A. E. H. P.	Radiator Type	Water Circulation	Oiling System	CARBU-RETER		Governor Make	Truck M. P. H.	IGNITION		START-ING	
						Front	Rear	Front	Rear								Make	Size			Fuel Feed	Current Source	Make	Make
Republic	75	\$1,250		124	56	56	32x4 1/2	32x4 1/2	Cont.	4	3 1/2 x 5	19.6	cel.	pu.	cir-spl.	Stmbg.	1	vac.		15	bat...	Aul...	Aul...	no.
Dearborn	E1	1,600		132	56	56 1/2	35x5p	35x5p	Bud.	4	3 1/2 x 5 1/2	21.03	cel.	pu.	hol.erk.	Str...	1	vac.		15	bat...	Conn...	West.	no.
Republic	10	1,395		124	56	56	34x3	34x4	Cont.	4	3 1/2 x 5	22.5	cel.	pu.	cir-spl.	Stmbg.	1	grv.		17	mag...	Bos...	Bos...	no.
Republic	10-E	1,695		124	56	56	35x5	35x5p	Cont.	4	3 1/2 x 5	22.5	cel.	pu.	cir-spl.	Stmbg.	1	grv.		25	mag...	Bos...	Bos...	no.
Wolverine	J-1			140	56	56 1/2	34x4	34x5*	Cont.	4	3 1/2 x 5	22.5	cel.	pu.	cir-spl.	Stmbg.	1	grv.		18	mag...	Eism...	Bos...	no.
Dearborn	F	2,180		126	56	56 1/2	34x4	34x5	Bud.	4	3 1/2 x 5 1/2	22.5	cel.	pu.	cir-spl.	Stmbg.	1	vac.		28	mag...			no.
Kelly-Springfield	K-34	2,900		144	57	60	36x6	36x6	own.	4	3 1/2 x 5 1/2	22.5	cel.	pu.		Zenith.	1	grv.		20	mag...			no.
Republic	11-X	1,795		144	56	57 1/2	34x4	34x5	Cont.	4	3 1/2 x 5 1/2	22.5	cel.	pu.	cir-spl.	Stmbg.	1	grv.		15	mag...	bat	Ber.	Bijur.
Velie	46	1,585		133	56	56	36x3 1/2	36x5	Cont.	4	3 1/2 x 5 1/2	22.5	cel.	pu.		Stmbg.	1	grv.		16	mag...			no.
Wolverine	J-1 1/2			140	56	56 1/2	34x3 1/2	34x5*	Cont.	4	3 1/2 x 5	22.5	cel.	pu.	pres.	Stmbg.	1	grv.		18	mag...	Bos...	Bos...	no.
Dearborn	48	2,590		148	56	56 1/2	34x4	34x7	Bud.	4	3 1/2 x 5 1/2	22.5	cel.	pu.	cir-spl.	Stmbg.	1	vac.		21	mag...	N.E.	N.E.	no.
Oshkosh	A			136	56	56	36x6p	36x7p	HS...	4	3 1/2 x 5	19.6	cel.	pu.		Stmbg.	1	vac.		21	mag...			no.
Wolverine	J-2			148	56	56 1/2	34x4*	34x7*	Cont.	4	3 1/2 x 5	22.5	cel.	pu.	pres.	Stmbg.	1	grv.		18	mag...	Eism...	Bos...	no.
Kelly-Springfield	K-38	3,250		150	60	62 1/2	36x4	36x7	own.	4	3 1/2 x 5 1/2	22.5	cel.	pu.		Zenith.	1 1/2	vac.		16	bat...	N.E.	N.E.	no.
Oshkosh	B			146	56	56	38x7p	38x7p	Her...	4	3 1/2 x 5	25.6	cel.	pu.	hol.erk.	Stmbg.	1 1/2	vac.		15	mag...			no.
Republic	19	2,195		144	56	57 1/2	36x4	36x7	Cont.	4	3 1/2 x 5 1/2	27.23	cel.	pu.	cir-spl.	Stmbg.	1	grv.		12	mag...			no.
Republic	19-W	2,195		154	56	57 1/2	36x4	36x7	Wau...	4	3 1/2 x 5	25.6	cel.	pu.	cir-spl.	Stmbg.	1	grv.		12	mag...			no.
Kelly-Springfield	K-41	4,200		156	70	65	36x5	36x10	own.	4	3 1/2 x 5 1/2	32.4	cel.	pu.	cir-spl.	Stmbg.	1	grv.		15	mag...			no.
Wolverine	K	2 1/2-3		168	58	60 1/2	36x4*	36x8*	Cont.	4	3 1/2 x 5 1/2	27.23	cel.	pu.	pres.	Stmbg.	1 1/2	grv.		14	mag...	Eism...	Bos...	no.
Republic	20	3 1/2	3,095	165	65	67 1/2	36x5	36x10	Cont.	4	3 1/2 x 5 1/2	32.4	cel.	pu.	cir-spl.	Stmbg.	1 1/2	grv.		12	mag...	Eism...	Bos...	no.
Wolverine	L	3 1/2		186	64 1/2	70	36x5	36x10	Cont.	4	3 1/2 x 5 1/2	32.4	cel.	pu.	pres.	Stmbg.	1 1/2	Grv.		12	mag...	Eism...	Bos...	no.
Kelly-Springfield	K-50	5	4,900	158	70	75 1/2	36x5	40x6d	own.	4	3 1/2 x 6 1/2	32.4	cel.	pu.		Zenith.				13	mag...			no.
Kelly-Springfield	K-60	6	5,100	158	170	177 1/2	36x6	40x7d	own.	4	3 1/2 x 6 1/2	32.4	cel.	pu.		Zenith.				13	mag...			no.



# Trucks Offered on the 1922 Market

MOTOR				CONTROLLER				DRIVE				SPRINGS			CONTROL		MAKE AND MODEL
Location and Number	Make	Horse power	Voltage	SPEED IN MILES PER HOUR		Location	Speeds	GEARING		Total Gear Ratio	Propulsion Taken By	Torque Taken By	Front	Rear	Steer	Controller Lever	
				Light	Loaded			Ahead	First Reduction								
unit-x-2...	G. E....	14	84	14	13	st-col.	4	spur-gear	spur-gear	11 5 1	rad-rl*	sp-rings	ell	ell	wheel-1	wheel-c	C. T. .... BR C. T. .... I C. T. .... B
unit-x-2...	G. E....	14	84	14	12	st-col.	4	spur-gear	spur-gear	11 5 1	rad-rl	sp-rings	ell	ell	wheel-1	wheel-c	
unit-x-2...	G. E....	2	84	12	10	st-col.	4	spur-gear	spur-gear	12 14 1	rad-rl	sp-rings	ell	ell	wheel-1	wheel-c	
unit-x-2...	G. E....	2	84	10	8	st-col.	4	spur-gear	spur-gear	17 32 1	rad-rl	sp-rings	ell	ell	wheel-1	u-wheel	C. T. .... AL C. T. .... AL C. T. .... AK
unit-x-4...	G. E....	14	84	11	9	st-col.	4	spur-gear	spur-gear	17 32 1	rad-rl	sp-rings	ell	ell	wheel-1	u-wheel	
unit-x-4...	G. E....	14	84	10	8	st-col.	4	spur-gear	spur-gear	20 14 1	rad-rl	sp-rings	ell	ell	wheel-1	u-wheel	
unit-w-2...	Own...	5	88	11	10	f-seat.	5	bevel	bevel	25 00 1	tor-arm	rad-rl	ell	ell	wheel-1	btw-seats	Couple Gear Couple Gear Couple Gear
unit-w-2...	Own...	5	88	11	8	f-seat.	5	bevel	bevel	25 00 1	tor-arm	rad-rl	ell	ell	wheel-1	btw-seats	
unit-w-2...	Own...	3	88	12	9.5	f-seat.	5	bevel	bevel	25 00 1	tor-arm	rad-rl	ell	ell	wheel-1	btw-seats	
unit-j-1	G. E....		88	12	10	in dash	4	bevel	rol-chain	11 9 1	rad-rl	sp-rings	ell	ell	wheel-1	b-wheel	Lansden Lansden Lansden
unit-j-1	G. E....		88	11	9	in dash	4	bevel	rol-chain	12 8 1	rad-rl	sp-rings	ell	ell	wheel-1	b-wheel	
unit-j-1	G. E....		88	10	8	in dash	4	bevel	rol-chain	13 1 1	rad-rl	sp-rings	ell	ell	wheel-1	b-wheel	
amid-u-1...	G. E....		88	9	7	in dash	4	bevel	rol-chain	12 3 1	rad-rl	sp-rings	ell	ell	wheel-1	b-wheel	Lansden Lansden Lansden
unit-x-1...	G. E....		88	10	15	in dash	4	bevel	rol-chain	11 12 1	sp-rings	tor-arm	ell	ell	wheel-1	b-wheel	
in wheels-1	G. E....	5.5	60	10	7	in dash	3	spur-gear	spur-gear	14 00 1	sp-rings	sp-rings	ell	ell	wheel-1	r-dash	
unit-x-1...	West...	3	60	15	14	u-seat	5	spur-gear	spur-gear	14 00 1	sp-rings	sp-rings	ell	ell	wheel-1	r-dash	TEC Walker Walker
unit-x-1...	West...	3	60	14	13	u-seat	5			16 1	sp-rings	sp-rings	ell	ell	wheel-1*	wheel-1*	
unit-x-1...	West...	6	60	12	11	u-seat	5			16 1 7 1	sp-rings	sp-rings	ell	ell	wheel-1*	wheel-1*	
unit-x-1...	West...	6	60	12	11	u-seat	5			18 1 6 1	sp-rings	sp-rings	ell	ell	wheel-1*	wheel-1*	Walker Walker Walker
amid-1...	G. E.-West		60	11	10	u-seat	5			18 1 6 1	sp-rings	sp-rings	ell	ell	wheel-1*	wheel-1*	
amid-1...	G. E.-West		60	11	11-13	chassis-f	4				sp-rings	sp-rings	ell	ell	wheel-1	wheel-1	
front-c-1...	G. E.-West		60	10-12	10-12	u-seat	4				sp-rings	sp-rings	ell	ell	wheel-1	wheel-1	Ward Ward Ward
front-c-1...	G. E.-West		60	9-10	10-12	u-seat	4				sp-rings	sp-rings	ell	ell	wheel-1	wheel-1	
amid-1...	G. E....		60	9-10	10-12	u-seat	4				sp-rings	sp-rings	ell	ell	wheel-1	wheel-1	
front-c-1...	G. E.-West		60	8-9	u-seat	4					sp-rings	sp-rings	ell	ell	wheel-1	wheel-1	Ward Ward Ward
front-c-1...	G. E.-West		60	7-8	u-seat	5					sp-rings	sp-rings	ell	ell	wheel-1	wheel-1	
front-c-1...	G. E.-West		60	6-7	u-seat	5					sp-rings	sp-rings	ell	ell	wheel-1	wheel-1	

**ABBREVIATIONS—Continued**  
**r-seat**—to right of seat  
**rol-chain**—silent chain  
**st-col**—steering column  
**tor-arm**—torque arm  
**u-bat**—under battery box

**u-floor**—under floor  
**u-hood**—under hood  
**unit-j**—unit jackshaft  
**unit-sf**—unit with side frame  
**unit-w**—unit with wheel  
**unit-x**—unit with axle

**u-lever**—under lever  
**u-plat**—under platform  
**u-wheel**—under steering wheel  
**u-seat**—under seat  
**1/2-ell**—1/2 elliptic  
**3/4-ell**—3/4 elliptic

**wheel-c**—wheel in center  
**wheel-l**—wheel on left  
**wheel-r**—wheel on right  
**C-G**—Couple Gear  
**G. E.**—General Electric  
**West**—Westinghouse

on the 1922 Market—Received Too Late to Classify.

TRANSMISSION SYSTEM											STEERING GEAR		WHEELS		FRAME				MAKE AND MODEL			
CLUTCH		GEARSET		POWER TAKE-OFF		REAR AXLE					Make	Model	Make	Type	Make	Material	Length from Cab to Rear	Maximum Body Length Recommended				
Make	Type	Make	Model	Forward Speeds	Stock	Provided For	Make	Model	Gear Reduction	Final Drive										Live Axle Type		
Fuller	d-d.	own...	75	1	no	yes	Tor...	750	5 28	1		Jac...		MWC...	wa							
Fuller	d-d.	Fuller	TW34	1	no	yes	Wis...		6 28	worm	fl.	Dit...		own	wa							
Fuller	d-d.	Fuller	TL	3	no	yes	Tor...	1000	6 28			Jac...	L-3A-50	MWC...	wa		Detroit.	p-stl.	94 1/2	96	Republic	75
Fuller	d-d.	Fuller	LT-4...	3	no	yes	Tor...	1000	6 28			Jac...	L-3A-50	MWC...	wa		Detroit.	p-stl.	98	108	Dearborn	E
Fuller	d-d.	Fuller	LTU	3	no	yes	Russ	P...	8 2			Gem	K...	MWC...	wa		Detroit.	p-stl.	95 1/2	108	Republic	10-E
Fuller	d-d.	Fuller	TL	3	no	yes	Wis...		7 5	worm	fl.	Dit...		own	wa		Smi...	p-stl.			Wolverine	J-1
Fuller	d-d.	Fuller	TU...	3	no	yes	Shl...		8 66	worm.		Gem...		own	wa						Dearborn	F
Fuller	d-d.	Fuller	TU...	3	no	yes	Tor...	CT-2...	8 0			Jac...	L-3A-50	MWC...	wa		Detroit.	p-stl.	141	228	Kelly-Springfield	K-34
Fuller	d-d.	Fuller	LTU	3	no	yes	Russ	5	8 8		fl.	Gem...		Mut...	wa		Dun...	p-stl.	118	144	Republic	11-X
Fuller	d-d.	Fuller	FI	4	yes	yes	Wis...		8 8	worm.	fl.	Dit...	K		wa				120	120	Vele	46
Fuller	d-d.	Fuller	35	4	yes	own...	own...	5	8 25	stb...	fl.	Ros...	B	own	wa		own...	p-stl.			Wolverine	J
Fuller	d-d.	Fuller	Dru...	3	no	yes	Russ...	5	8 8		fl.	Gem...	K		wa		own...	p-stl.			Dearborn	48
Fuller	d-d.	Bh	50	3	no	yes	Shl...		8 66	worm.	fl.	Gem...		R-A	wa		Smi...	p-stl.			Oshkosh	A
Fuller	d-d.	Fuller	GT	4	no	yes	Tor...	CT-2	8		fl.	Gem...	M	Roy...	wa			p-stl.			Wolverine	J-2
Fuller	d-d.	Fuller	GI	4	no	yes	Tor...	CT-2	8		fl.	Jac...	L-3A-50	MWC...	wa		Detroit.	p-stl.	121	144	Kelly-Springfield	K-38
Fuller	d-d.	Fuller	Gu-7...	4	no	yes	Tor...	CT-2	10		fl.	Jac...	L-3A-50	MWC...	wa		Detroit.	p-stl.	125	144	Republic	B
Fuller	d-d.	Fuller	Gus	4	no	yes	Clas		10		fl.	Jac...	L-3A-50	MWC...	wa		Detroit.	p-stl.	125	144	Republic	19-W
Fuller	d-d.	Fuller	Gu-7...	4	no	yes	Russ...	U...	9 4		fl.	Ros	XD...	MWC...	wa			p-stl.	144	268	Kelly-Springfield	K-41
Fuller	d-d.	Fuller	FI	4	no	yes	Tor...	E-1	10 26		fl.	Jac...	10 C	Smi...	wa		Detroit.	p-stl.			Wolverine	K
Fuller	d-d.	Fuller	Gus	4	no	yes	Clas	30	10		fl.	Ros	BM...	Clas	wa		own...	p-stl.	146	171	Republic	20
Fuller	d-d.	Fuller		4	no	yes	OWN...		12 24		fl.	Ros			wa		own...	p-stl.			Wolverine	L
Fuller	d-d.	Fuller		4	no	yes	OWN...		12 24		fl.	Ros			wa		own...	p-stl.			Kelly-Springfield	K-50
Fuller	d-d.	Fuller		4	no	yes	OWN...		12 24		fl.	Ros			wa		own...	p-stl.			Kelly-Springfield	K-60

## 1922 TRAILERS

MAKE AND MODEL		PRICE				FRAME			TIRES		WHEELS		BEARINGS		BRAKES			BODY				
		Tons Capacity	Chassis Only	Complete With Body	Reversibility	Wheelbase, Inches	Material	Length, Inches	Width, Inches	Make	Kind	Front	Rear	Type	Make	Type	Make	Fitted	Location	Medium	Type	Height of Load Platform Above Ground, Inches
Arcadia	100	1	\$150	\$150		88	rol-c...	114	30	own.	sol...	28x2	28x2	wd.	Way	taper...	Tim...	no	wheels...	hand...	exp...	26
Arcadia	202	2	250		opt.	84	rol-I...	111		own.	sol...	32x3 1/2	32x3 1/2	wd.	Way	taper...	Tim...	yes	wheels...	hand...	opt...	
Arcadia	302	3	1,170	extra	yes	84	rol-c...	144	36	own.	sol*	36x4	36x4	wd.	Way	taper...	Tim...	yes	wheels...	hand...	extra.	
Arcadia	402	4	1,400	extra.	yes	84	rol-c...	144	40	own.	sol*	36x5	36x5	wd.	Way	taper...	Tim...	yes	wheels...	hand...	extra.	
Arcadia	502	5	1,680	extra.	yes.	84	rol-c...	144	40	own.	sol*	36x6	36x6	wd.	Way	taper...	Tim...	yes	wheels...	hand...	extra.	
Automotive..	Reversible	2	1,175		yes	108	p-stl...	144	36	P&B	sol...	36x4 1/2	36x4 1/2	mt.	Day...	roller*	Bock*					
Automotive..	Reversible	3	1,315		yes	108	p-stl...	144	36	P&B	sol...	36x4	36x4	mt.	Day...	roller*	Bock*					
Automotive..	Reversible	5	1,750		yes	132	p-stl...	168	36	P&B	sol...	36x6	36x6	mt.	Day...	roller*	Bock*					
Automotive..	Reversible	7	2,050		yes	132	p-stl...	168	36	P&B	sol...	36x7	36x7	mt.	Day...	roller*	Bock*					
Automotive..	Reversible	10	2,575		yes.	132	p-stl...	168	36	P&B	sol...	36x10	36x10	mt.	Day...	roller*	Bock*					
Automotive..	Reversible	15	3,150		yes.	132	p-stl...	168	36	P&B	sol...	36x12	36x12	mt.	Day...	roller*	Bock*					
Automotive..	Reversible	20	3,550		yes	132	p-stl...	168	36	P&B	sol...	40x14	40x14	mt.	Day...	roller*	Bock*					
Automotive		2	980		no	84	p-stl...	144	36	P&B	sol...	36x3 1/2	36x4	mt.	Day...	roller*	Bock*					
Automotive		3	1,125		no	84	p-stl...	144	36	P&B	sol...	36x4	36x5	mt.	Day...	roller*	Bock*					
Automotive		5	1,575		no	100	p-stl...	168	36	P&B	sol...	36x6	40x7	mt.	Day...	roller*	Bock*					
Automotive		7	1,850		no	100	p-stl...	168	36	P&B	sol...	36x7	40x8	mt.	Day...	roller*	Bock*					
Automotive		10	2,175		no	100	p-stl...	168	36	P&B	sol...	36x8	40x10	mt.	Day...	roller*	Bock*					
Automotive		15	2,825		no	100	p-stl...	168	36	P&B	sol...	36x10	40x12	mt.	Day...	roller*	Bock*					
Automotive		20	3,175		no	100	p-stl...	168	36	P&B	sol...	40x14	40x14	mt.	Day...	roller...	Bock*					
Byron	R-3	3			yes.	96	rol-c...	144	36	own.	sol*	36x4	36x4	wd.	Bim...	roller...	Tim...	yes	wheel-4...	hand...	opt...	44
Byron	R-5	5			yes	120	rol-c...	168	36	own.	sol*	36x6	36x6	wd.	Bim...	roller...	Tim...	yes	wheel-4...	hand...	opt...	44
Eagle	GG	2	750		no	86	rol-c...	144	37	Amer.	sol...	32x3	32x3	art.	Way...	roller...	Bow*	no			opt...	
Eagle	CC	3	1,200		yes	120	rol-c...	168	38	Amer.	sol...	36x4	36x4	art.	Way...	roller...	Bow*	no			opt...	
Eagle	CC	5	1,400		yes.	120	rol-c...	168	38	Amer.	sol...	36x6	36x6	art.	Way...	roller...	Bow*	no			opt...	
Eagle	DD	3	1,200		yes	96	rol-c...	144	40	Amer.	sol...	36x5	36x5	mt.	F&H	roller...	F&H	no			opt...	
Eagle	DD	5	1,350		yes	96	rol-c...	144	40	Amer.	sol...	36x6	36x6	mt.	F&H	roller...	F&H	no			opt...	
Eagle	D	5	675		yes	102	wood...			own.	stl...	44x8 1/2	44x8 1/2	mt.	F&H	roller...	F&H	no			dmp	74
Eagle	BB	5	525		yes	112	wood...			own.	stl...	36x6 1/2	36x6 1/2	mt.	F&H	roller...	F&H				opt...	44
Eagle	Logging	5	550		yes	144	wood...			own.	stl...	44x8 1/2	44x8 1/2	mt.	F&H	roller...	F&H				hol...	48
Eagle	S	5	755		yes	102	wood...			own.	stl...	44x8 1/2	44x8 1/2	mt.	F&H	roller...	F&H				dmp	74
Fruehauf	S-415-N	1 1/2			yes	90	rol-c...	144	66	own.	sol...	34x3 1/2	34x3 1/2	wd...	Roy...	taper...	Tim...	opt...	wheel-r...	hand...	opt...	44
Fruehauf	S-415-R	1 1/2			yes.	90	rol-c...	144	66	own.	sol...	34x3 1/2	34x3 1/2	wd...	Roy...	taper...	Tim...	opt...	wheel-r...	hand...	opt...	44
Fruehauf	S-430-N	4			no	93	p-stl...	156	72	own.	sol...	34x5	34x5	wd...	Roy...	taper...	Tim...	opt...	wheel-r...	hand...	opt...	44
Fruehauf	S-430-R	4			yes.	93	p-stl...	156	72	own.	sol...	34x5	34x5	wd...	Roy...	taper...	Tim...	opt...	wheel-r...	hand...	opt...	45
Fruehauf	S-450-R	6			yes.	105	rol-c...	168	84	own.	sol...	36x7	36x7	wd...	Roy...	taper...	Tim...	opt...	wheel-r...	hand...	opt...	48
Fruehauf	S-450-N	6			no	105	rol-c...	168	84	own.	sol...	36x7	36x7	wd...	Roy...	taper...	Tim...	opt...	wheel-r...	hand...	opt...	48
Hesse	9	1 1/4			yes		rol-c...	120	38	own.	sol*	30x2 1/2	30x2 1/2	wd...		roller...	Bow...	opt...	opt...	h&f...	opt...	
Hesse	9NR	1 1/4			yes		rol-c...	120	42	own.	sol*	30x2 1/2	30x2 1/2	wd...		roller...	Bow...	opt...	opt...	h&f...	opt...	
Hesse	8	1 3/4			yes		rol-c...	120	38	own.	sol*	32x3	32x3	wd...		roller...	Bow...	opt...	opt...	h&f...	opt...	
Hesse	8NR	1 3/4			no		rol-c...	120	38	own.	sol*	32x3	32x3	wd...		roller...	Bow...	opt...	opt...	h&f...	opt...	
Hesse	7	3			yes		rol-c...	132	42	own.	sol*	34x4	34x4	wd...		roller...	Bow...	opt...	opt...	h&f...	opt...	
Hesse	7NR	3			no		rol-c...	132	36	own.	sol*	34x4	34x4	wd.		roller...	Bow...	opt...	opt...	h&f...	opt...	
Hesse	6	5			yes		rol-c...	144	42	own.	sol*	36x6	36x6	wd...		roller...	Bow...	opt...	opt...	h&f...	opt...	
Hesse	6NR	5			no		rol-c...	144	36	own.	sol*	36x6	36x6	wd...		roller...	Bow...	opt...	opt...	h&f...	opt...	
Highway	A-4	1 1/2	785	945	yes	88	rol-c...	144	35	own.	sol...	32x3 1/2	32x3 1/2	wd*	St.M.	taper...	Tim...	yes	wheel-r...	hand...	stk...	41
Highway	B-4	2 1/2	995	1,170	yes.	88	rol-c...	144	35	own.	sol...	36x4	36x4	wd*	St.M.	taper...	Tim...	yes	wheel-r...	hand...	stk...	45
Highway	N-4	4	1,325	1,475	yes.	84	rol-c...	144	40	own.	sol...	36x5	36x5	wd*	St.M.	taper...	Tim...	yes	wheel-r...	hand...	stk...	46
Highway	P-4	6	1,695	1,845	yes.	86	rol-c...	144	40	own.	sol...	36x7	36x7	wd*	St.M.	taper...	Tim...	yes	wheel-r...	hand...	stk...	47
Jackson	3-4	3	850	950	no	88	a-iron	120	36	own.	sol...	36x3 1/2	36x3 1/2	mt.	own	roller...	Tim...	no			opt...	36
Jackson	5-4	5	1,250	1,400	no	98	a-iron	144	44	own.	sol...	36x7	36x7	mt.	own.	roller...	Tim...	no			opt...	38
Martin	42	3	625		yes	opt...	pl-c...	opt...	opt...		sol...	36x3	36x3	wd...		fl-b...	own...				opt...	
Martin	43	5	980		yes.	opt...	pl-c...	opt...	opt...		sol...	36x4	36x4	wd...		fl-b...	own...				opt...	
Martin	44	8	1,260		yes.	opt...	pl-c...	opt...	opt...		sol...	36x5	36x5	wd...		fl-b...	own...				opt...	
Martin	45	12	1,690		yes	opt...	pl-c...	opt...	opt...		sol...	36x6	36x6	wd...		fl-b...	own...				opt...	
Miami	46	20	3,050			opt...	pl-c...	opt...	opt...		sol...	36x6 1/2	36x6 1/2	wd...		fl-b...	own...				opt...	
Miami	3	3 1/4	268	318	no	70	rol-c...	96	38	own.	sol*	30x3	30x3	art.	Stan	taper...	Tim...	no			stk*	26
Miami	10	1	440	500	no	76	rol-c...	105	38	own.	sol*	32x3	32x3	art.	Stan	taper...	Tim...	no			stk*	44
Miami	12	1 1/2	485	605	no	84	rol-c...	116	38	own.	sol*	32x3	32x3	art.	Stan	taper...	Tim...	no			stk...	44
Miami	13	2	625	770	no	84	rol-c...	116	38	own.	sol*	32x3 1/2	32x3 1/2	art.	Stan	taper...	Tim...	no			stk...	44
Miami	14	3	950	1,165	no	90	rol-c...	138	38	own.	sol*	36x5	36x5	art.	Stan	taper...	Tim...	no			stk...	46
Miami	15	5	1,175	1,390	no		rol-c...	168		own.	sol*	36x6	36x6	art.	Stan	taper...	Tim...	no			stk...	48
Newcomer	B	2	800		opt.	72	rol-c...	144	36	own.	sol...	36x4	32x3 1/2	wd...	Way	taper...	Tim...	opt...	wheel-r...	hand...		
Newcomer	C	3	1,000		opt.	160	rol-c...	162	36	own.	sol...	36x4	36x4	wd...	Way	taper...	Tim...	opt...	wheel-r...	hand...		

## ABBREVIATIONS—Types of Construction

\*with other options  
a-iron angle iron  
art—armory  
auto—automatic brake  
control  
bol—bolster  
dmp—dump

exp—express  
fl-b—floating bushing  
h & f—head and foot  
mt—metal  
opt—optional  
p & s—platform and  
skid

pl-c—platform construction  
pnu—pneumatic  
p-stl—pressed steel  
rck—rock  
rol-c—rolled channel  
rol-I—rolled I beam  
sol—solid

spr—spreader  
stk—stake  
stl—steel  
wd—wood  
wheel-f front wheels  
wheel-r rear wheels  
wheel-2 two wheels  
wheel-4 four wheels



## Four-Wheeled Trailers—Concluded

NAME AND MODEL		PRICE				FRAME				TIRES		WHEELS		BEARINGS		BRAKES		BODY				
		Tons Capacity	Chassis Only	Complete With Body	Reversibility	Wheelbase, Inches	Material	Length, Inches	Width, Inches	Make	Kind	Front	Rear	Type	Make	Type	Make	Fitted	Location	Medium	Type	Height of Load Platform Above Ground, Inches
Newcomer	D 4	1,275		opt.	100	rol-c.	168	39	own.	sol.	36x5	36x5	wd.	Wes.	taper.	Tim.	opt.					
Newcomer	E 5	1,450		opt.	100	rol-c.	168	39	own.	sol.	36x6	36x6	wd.	Wes.	taper.	Tim.	opt.	wheel-r.	hand.			
Newcomer	F 7½	1,625		opt.	124	rol-c.	192	39	own.	sol.	36x8	36x8	wd.	Wes.	taper.	Tim.	opt.	wheel-r.	hand.			
Ohio	2-D 2	895	1,145	yes.	96	p-stl.	144	33	Hvt.	sol.	36x3½	36x3½	art.	Way.	taper.	Gill.	yes.	wheel-2.	hand.	stk.	42	
Ohio	3-F 3	1,140	1,390	yes.	90	p-stl.	144	34½	Hvt.	sol.	36x5	36x5	art.	Way.	taper.	Gill.	yes.	wheel-2.	h&f.	stk.	42	
Ohio	5-F 5-6	1,645	1,895	yes.	88	p-stl.	144	41	Hvt.	sol.	36x6	36x6	art.	Way.	taper.	Tim.	yes.	wheel-2.	hand.	stk.	42	
Ralston	E 1½	600		no.	78	rol-c.	144	37	own.	sol.	32x3	32x3	wd.	Sch.	taper.	Tim.	opt.	wheel-r.	auto.	no.		
Ralston	ER 1½	720		yes.	78	rol-c.	144	37	own.	sol.	32x3	32x3	wd.	Sch.	taper.	Tim.	opt.	wheel-r.	auto.	no.		
Ralston	F 2	775		no.	78	rol-c.	144	40	own.	sol.	32x3½	32x3½	wd.	Sch.	taper.	Tim.	opt.	wheel-r.	auto.	no.		
Ralston	FR 2	940		yes.	78	rol-c.	144	40	own.	sol.	32x3½	32x3½	wd.	Sch.	taper.	Tim.	opt.	wheel-r.	auto.	no.		
Ralston	K 2	975		no.	108	rol-c.	180	65	own.	sol.	32x3½	32x3½	wd.	Sch.	taper.	Tim.	opt.	wheel-r.	auto.	no.		
Ralston	G 3	975		no.	78	rol-c.	144	40	own.	sol.	34x4	34x4	wd.	Sch.	taper.	Tim.	opt.	wheel-r.	auto.	no.		
Ralston	GR 3	1,160		yes.	78	rol-c.	144	40	own.	sol.	34x4	34x4	wd.	Sch.	taper.	Tim.	opt.	wheel-r.	auto.	no.		
Ralston	L 4	1,375		no.	108	rol-c.	180	65	own.	sol.	34x5	34x5	wd.	Sch.	taper.	Tim.	opt.	wheel-r.	auto.	no.		
Ralston	H 4	1,225		no.	78	rol-c.	144	42	own.	sol.	34x5	34x5	wd.	Sch.	taper.	Tim.	opt.	wheel-r.	auto.	no.		
Ralston	HR 4	1,430		yes.	78	rol-c.	144	42	own.	sol.	34x5	34x5	wd.	Sch.	taper.	Tim.	opt.	wheel-r.	auto.	no.		
Reliance	42 1	600		opt.	78	p-stl.	144	38	own.	sol.	32x3½	32x3½	art.	own.	taper.	Tim.	yes.	wheel-r.	hand.			
Reliance	44 2	775		opt.	78	p-stl.	144	38	own.	sol.	32x4	32x4	art.	own.	taper.	Tim.	yes.	wheel-r.	hand.			
Reliance	46 3	980		opt.	78	p-stl.	144	38	own.	sol.	34x5	34x5	art.	own.	taper.	Tim.	yes.	wheel-r.	hand.			
Reliance	46D 3	1,150		no.	144	p-stl.	180	70	own.	sol.	34x4	34x6	art.	own.	taper.	Tim.	yes.	wheel-r.	hand.			
Reliance	415 3½	1,650		pt.	112	p-stl.	168	38	own.	sol.	36x8	36x8	mt.	own.	taper.	Tim.	yes.	wheel-r.	hand.			
Reliance	48 4	1,240		opt.	78	p-stl.	144	38	own.	sol.	36x6	36x6	mt.	own.	taper.	Tim.	yes.	wheel-r.	hand.			
Reliance	410D 5	1,555		no.	144	p-stl.	204	56	own.	sol.	36x6	36x10	art.	own.	taper.	Tim.	yes.	wheel-r.	hand.			
Reliance	410 5	1,400		opt.	112	p-stl.	168	38	own.	sol.	36x7	36x7	mt.	own.	taper.	Tim.	yes.	wheel-r.	hand.			
Rogers	2-NR 2			no.	96	rol-c.	144	40	own.	sol.	34x3	34x3	wd.	H&D.	roller.	Bow.	no.			no.		
Rogers	2-STG 2			yes.	96	rol-c.	144	40	own.	sol.	34x3	34x3	wd.	H&D.	roller.	Bow.	no.			no.		
Rogers	3-NR 3			no.	120	rol-c.	168	39½	own.	sol.	36x5	36x5	wd.	H&D.	roller.	Bow.	no.			no.		
Rogers	3-STG 3			yes.	120	rol-c.	168	39½	own.	sol.	36x5	36x5	wd.	H&D.	roller.	Bow.	no.			no.		
Rogers	5-NR 5			no.	120	rol-c.	168	40	own.	sol.	36x6	36x6	wd.	H&D.	roller.	Bow.	no.			no.		
Rogers	5-STG 5			yes.	120	rol-c.	168	40	own.	sol.	36x6	36x6	wd.	H&D.	roller.	Bow.	no.			no.		
Samson	CGN 2	835	910	no.		rol-c.			own.	sol.			wd.		taper.	Tim.	opt.			stk.		
Samson	CGN 5	1,200	1,355	no.		rol-c.			own.	sol.			wd.		taper.	Tim.	opt.			stk.		
Samson	CGN 7	1,470	1,625	no.		rol-c.			own.	sol.			wd.		taper.	Tim.	opt.			stk.		
Samson	CGR 2	885	960	yes.		rol-c.			own.	sol.			wd.	St.M.	taper.	Tim.				stk.		
Samson	CGR 5	1,375	1,440	yes.		rol-c.			own.	sol.			wd.	St.M.	taper.	Tim.				stk.		
Samson	CGR 7	1,545	1,700	yes.		rol-c.			own.	sol.			wd.	St.M.	taper.	Tim.				stk.		
Texas	1	375				rol-c.			own.	sol.			art.	St.M.	roller.	Tim.						
Texas	2	540				rol-c.			own.	sol.			art.	St.M.	roller.	Tim.						
Texas	3	650				rol-c.			own.	sol.			art.	St.M.	roller.	Tim.						
Texas	5	760				rol-c.			own.	sol.			art.	St.M.	roller.	Tim.						
Texas	7	840				rol-c.			own.	sol.			art.	St.M.	roller.	Tim.						
Trailmobile	CC 1			no.	74½	a-iron.	114	37	own.	sol.	32x2	32x3½	wd.	Stan.	taper.	Bock.	extra.	wheel-r.		opt.		
Trailmobile	D 1½			no.	74	rol-c.	121½	37	own.	sol.	32x3	32x3	wd.	Stan.	taper.	Bock.	extra.	wheel-r.		opt.		
Trailmobile	E 2			no.	88	rol-c.	144	36	own.	sol.	36x4	36x4	wd.	Stan.	taper.	Bock.	extra.	wheel-r.		opt.		
Trailmobile	F 3½			no.	88	rol-c.	144	39	own.	sol.	36x5	36x5	wd.	Stan.	taper.	Bock.	extra.	wheel-r.		opt.		
Trailmobile	G 5			no.	88	rol-c.	144	42	own.	sol.	36x7	36x7	wd.	Stan.	taper.	Bock.	extra.	wheel-r.		opt.		
Trailmobile	K 2			yes.	88	rol-c.	144	36	own.	sol.	36x4	36x4	wd.	Stan.	taper.	Bock.	extra.	wheel-r.		opt.		
Trailmobile	L 3½			yes.	88	rol-c.	144	39	own.	sol.	36x5	36x5	wd.	Stan.	taper.	Bock.	extra.	wheel-r.		opt.		
Trailmobile	M 5			yes.	88	rol-c.	144	42	own.	sol.	36x7	36x7	wd.	Stan.	taper.	Bock.	extra.	wheel-r.		opt.		
Troy	15-NR 1	570		yes.	75	rol-c.	114	35	own.	pnu.	31x4	31x4	wd.	MWC.	taper.	Gill.	opt.	wheel-r.	hand.	opt.	35	
Troy	110-DF 2	1,265		yes.	97	rol-i.	146	35	own.	sol.	32x3½	32x3½	wd.	Bim.	roller.	Bow.	opt.	wheel-r.	hand.	opt.	55½	
Troy	110-D 2	980		yes.	91	rol-c.	120	34	own.	sol.	32x3½	32x3½	wd.	Bim.	roller.	Bow.	opt.	wheel-f.	hand.	opt.	40	
Troy	212-DF 3	1,800		yes.	115	rol-i.	175	43	own.	sol.	36x5	36x5	wd.	Bim.	roller.	Bow.	opt.	wheel-f.	hand.	opt.	60	
Troy	212-D 3	1,500		yes.	83	rol-i.	142	41	own.	sol.	36x4	36x4	wd.	Bim.	roller.	Bow.	opt.	wheel-f.	hand.	opt.	43½	
Troy	512-D 5	2,100		yes.	83	rol-c.	142	41	own.	sol.	36x7	36x7	wd.	Bim.	roller.	Bow.	opt.	wheel-f.	hand.	opt.	44	
Warner	60 2	1,175		yes.	78	rol-c.	132	21½	own.	sol.	36x4	36x4	art.		roller.		yes.	wheel-r.	hand.			
Warner	61 3	1,430		yes.	82½	rol-c.	144	34½	own.	sol.	36x5	36x5	art.		roller.		extra.	wheel-r.	hand.			
Warner	62 5	1,930		yes.	93½	rol-c.	150	37		sol.	36x6	36x6	art.		roller.		extra.	hand.				
Warner	54 7	2,200		yes.						sol.	36x7	36x7	art.									
Wolverine	3	895				rol-i.				sol.	36x5	36x5	wd.		roller.							
Wolverine	5	975				rol-i.				sol.	36x6	36x6	wd.		roller.							
Wolverine	4	1,050								sol.	36x7	36x7	wd.		roller.							
Wolverine	8	1,455								sol.	36x5d	36x5d	wd.		roller.							
Wolverine	10	1,625									40x6d	40x6d	wd.		roller.							

## ABBREVIATIONS—Makers of Parts

\*with other options  
 Bim—Bimbel  
 Bow—Bowling  
 Cn—Clegg & MacMahon  
 Day—Dayton

F & H—French & Hecht  
 Gill—Gilliam Mfg. Co.  
 G. R. M.—Good Roads Machinery Co.  
 H&D—Hoops Bros. & Darlington

Kel—Kelsey  
 Ken—Kensha  
 M. W. C.—Motor Wheel Corp.  
 Nor—Northern  
 Park—Parker  
 P&B—Parish & Bingham  
 Roy—Royer

Sch—Schwarz Wheel Co.  
 Stan—Stanley Wheel Co.  
 Stn—Stanton Steel Wheel  
 St. M—St. Mary  
 Tim—Timken  
 Way—Wayne  
 Wes—Western

## Two-Wheeled Trailers

MAKE AND MODEL	Tons Capacity	PRICE		Reversibility	Wheelbase, Inches	FRAME		TIRES		WHEELS		BEARINGS		BRAKES			BODY			
		Chassis Only	Complete With Body			Material	Length, Inches	Width, Inches	Make	Kind	Front	Rear	Type	Make	Type	Make	Fitted	Location	Medium	Type
Adams.....A	3 1/2		\$150					own...	pnu...		30x31	wd...		taper...					opt...	24
Adams.....Totem	4		175			p-stl		own...	pnu...		30x32	wd...		taper...						
Adams.....Motorbungalow	4		495					own...	pnu...		30x32	wd...		taper...						
Automotive.....	1 1/2	150	100			a-iron...	72	48	own...	sol...	32x3	mt...	Ken...	taper*	Bock...					
Automotive.....	1	300	no...			apt	72	48	own...	sol...	30x3 1/2	mt...	Ken...	taper*	Bock...					
Automotive.....	2	450	100			p-stl...	120	36	P&B...	sol...	36x5	mt...	Day...	taper*	Bock...					
Automotive.....	3	500	no...			p-stl...	120	36	P&B...	sol...	36x6	mt...	Day...	taper*	Bock...					
Bower.....	1 1/2		115	no...		wood...	72	44	own...	sol...		wd...				no...			exp...	
Bower.....	1 1/2		140	no...		wood...	90	46	own...	sol...	32x2	wd...				no...			exp...	
Byron.....P-21	2 1/2		100			rol-c...	52	41 1/2	own...	sol*		36x6	wd...	Bim...	roller...	Tim...	no...		bol...	51
Byron.....P-4	4		no...			rol-c...	52	50	own...	sol*		36x8	wd...	Bim...	roller...	Tim...	no...		bol...	52
Byron.....Clare	1 1/2	70	85			wood...			own...	pnu*		30x3 1/2	wd...		roller*	Tim...				
Eagle.....	3 1/2	800	850	yes...		rol-c...	123	48	own...	sol*	44x6	mt*	F&H...	roller...	F&H...			stk...	37	
Fix.....A	4	75	100		50	wood...	82	47			28x2	wd...	Kel...	taper*	Tim...	no...		opt...	26	
Fix.....D	4		125			wood...	84	47	own...	sol	32x2	wd...	Kel...	roller...	Hyt...	no...		opt...	26	
Hesse.....	80					rol-c...			own...	pnu*		32x3	wd...		roller...	Bow...				
Hesse.....70S	3 1/2					rol-c...			own...	pnu*		34x4	wd...		roller...	Bow...				
Hesse.....	60					rol-c...			own...	pnu*		30x6	wd...		roller...	Bow...				
Highway.....A-2	3 1/2		120			wood...	84	48	own...	pnu...		30x3	wd*	St.M...	ball...				exp*	
Highway.....C-2	1 1/2	250	280			rol-c...	108	48	own...	sol...	32x3 1/2	wd*	St.M...	taper...	Tim...					
Highway.....B-2	1		155			wood...	96	48	own...	sol	32x2	wd*	St.M...	roller...	Bow...				exp*	
King.....P-20	2	590				rol-c...			own...	sol*		36x5	wd...	MWC...	taper...	Bock*	no...		bol...	
King.....P-25	3 1/2	650				rol-c...			own...	sol*		36x7	wd...	MWC...	taper...	Bock*	no...			
King.....P-50	5	765				rol-c...			own...	sol*		36x8	wd...	MWC...	taper...	Bock*	no...			
Lyons.....E-2	3 1/2					p-stl			own...	pnu...		30x3	wd...	own	ball	own...	no...		rek*	26
Martin Farmer No. 1	1		250							sol		44x4	wd...		fl-b	own...			exp	
Martin Farmer No. 2	1 1/2		385							sol		36x3	wd...		fl-b	own			exp	
Miami.....	100	15	158	no		rol-c			own...	sol*		30x4	art...	Stan...	taper...	Tim...	no...		exp...	36
Nepeasing.....	19		100	no		wood...				sol*		30x4	wd...	Ford...	roller...		no...		exp*	36
Nepeasing.....	21		100	no		wood...				sol*		30x4	wd...	Ford...	roller...		no...		exp*	36
Ralston.....C	1 1/2		125	no		a-iron...	72	45	own...	opt...		30x3	wd...		ball		no...		rek...	26
Ralston.....D			190	no...		a-iron...	72	45	own...	opt...		31x4	mt...	Park...	taper...	Tim...	no...		rek...	31
Ralston.....B	1		340	no		a-iron...	92	43	own...	sol		32x3	wd...	Stan...	taper*	Tim*	no		stk...	24
Ralston.....A	1		300	no		a-iron...	92	43	own...	sol		32x3	wd...	Stan...	taper...	Tim*	no		rek...	24
Rogers.....B	1 1/2					a-iron...	72	46	own...	sol...		32x2	wd...	H&D...	ball	Tim...	no...		exp...	
Rogers.....A	1					a-iron...	96	46	own...	sol		32x2	wd...	H&D...	roller...	Bow...			exp	
Rogers.....1-M	1					a-iron...	72	42	own...	sol...		32x2	wd...	H&D...	roller...	Bow...	no...		dmp.	
Rogers.....2-M	2					a-iron...	72	46	own...	sol...		36x5	wd...	H&D...	roller...	Bow...	no...		dmp.	
Rogers.....3-M	3					a-iron...	84	55	own...	sol...		36x7	wd...	H&D...	roller...	Bow...	no...		dmp.	
Standard.....A-6	1 1/2	95	110			wood...	72	46	own...	sol*		28x2	wd*	Bim...	taper...	Tim...	no		opt...	25
Standard.....B-8	1	130	150			wood...	96	46	own...	sol*		30x2	wd*	Bim...	taper...	Tim...	no		opt...	27
Syracuse.....	2 1/2		90	no		wood...	64	42	own...	pnu		30x3	art...		ball	Ford...	no		exp...	26
Trailmobile.....U-70	1 1/2		100			rol-c...	70	39	own...	sol		36x4	wd*	Stan...	taper...	Bock...				
Trailmobile.....W-2	2		100			rol-c...	70	39	own...	sol...		36x4	wd*	Stan...	taper...	Bock...				
Trailmobile.....W-3	3		100			rol-c...	72	39	own...	sol...		36x6	wd*	Stan...	taper...	Bock...				
Trailmobile.....W-5	5		100			rol-c...	74	41	own...	sol		36x7	wd*	Stan...	taper...	Bock...				
Trailmobile.....W-7	7		no...			rol-c...	78	43	own...	sol		36x5d	wd*	Stan...	taper*	Bock...				
Warner.....K-11	4 1/2		170			rol-c...			own...	pnu		30x3	art...							
Warner.....K-21	2 1/2		155						own...	opt...		36x3	art...		roller...	Bock...			exp	
Warner.....G-31	2 1/2		260						own...	opt...		36x3	art...		roller...	Bock...			exp	

## Two-Wheeled Pole and Lumber Trailers

MAKE AND MODEL		Tons Capacity	PRICE		Reversibility	Wheelbase, Inches	FRAME			TIRES		WHEELS		BEARINGS		BRAKES		BODY		
			Chassis Only	Complete With Body			Material	Length, Inches	Width, Inches	Make	Kind	Front	Rear	Type	Make	Type	Make	Fitted	Location	Medium
Arcadia	270	2	\$55	extra			rol-c	60	46	own...	sol...		32x3 1/2	wd...	Way...	taper...	Tim...	no		bol.
Arcadia	470	4					rol-c	60	46	own...	sol		36x5	wd...	Way...	taper...	Tim...	no		bol.
Arcadia	670	6					rol-c	60	50	own...	sol*		36x7	wd...	Way...	taper...	Tim...	no		bol.
Automotive		1	400	no			p-stl	53	36	P&B	sol...	36x3 1/2		mt...	Day...	roller*	Bock*			



Two-Wheeled Pole and Lumber Trailers—Concluded

MAKE AND MODEL	Tons Capacity	PRICE		Reversibility	Wheelbase, Inches	FRAME				TIRES		WHEELS		BEARINGS		BRAKES			BODY		
		Chassis Only	Complete With Body			Material	Length, Inches	Width, Inches	Make	Kind	Front	Rear	Type	Make	Type	Make	Fitted	Location	Medium	Type	Height of Load Above Ground, Inches
Automotive	2	595		no		p-stl	53	36	P&B	sol	36x5		mt	Day							
Automotive	3	665		no		p-stl	53	36	P&B	sol	36x6		mt	Day	roller*	Bock*					
Automotive	5	880		no		p-stl	53	36	P&B	sol	36x8		mt	Day	roller*	Bock*					
Automotive	7	1,125		no		p-stl	53	36	P&B	sol	36x10		mt	Day	roller*	Bock*					
Automotive	10	1,475		no		p-stl	53		P&B	sol	40x14		mt	Day	roller*	Bock*					
Fruehauf	B-215	11 1/2				rol-c	66	own	sol		34x14 1/2		wd	Roy	taper	Tim	opt	wheels	hand	bol	51
Fruehauf	B-220	3				rol-c	72	own	sol		34x5		wd	Roy	taper	Tim	opt	wheels	hand	bol	51
Fruehauf	B-240	5				p-stl	78	own	sol		36x7		wd	Roy	taper	Tim	opt	wheels	hand	bol	52
Fruehauf	B-260	8				rol-c	84	own	sol		40x10		wd	Roy	taper	Tim	opt	wheels	hand	bol	50
Fruehauf	B-2100	12				rol-c	96	own	sol		40x14		mt	Sch	taper	Tim	opt	wheels	hand	bol	55
Fruehauf	B-2150	pc				rol-c	96	own	sol		40x14d		mt	Sch	taper	Tim	opt	wheels	hand	bol	55
Highway	R-2	2	510			rol-c	66	43	own	sol	36x4		wd*	St.M	taper	Tim					
Highway	S-2	3	655			rol-c	68	43	own	sol	36x6		wd*	St.M	taper	Tim					
Highway	V-2	5	955			rol-c	68	43	own	sol	36x8		wd*	St.M	taper	Tim					
Highway	Y-2	10	1,495			rol-c	68	52	own	sol	36x6		wd*	St.M	taper	Tim					
Jackson	3-P	3	400			a-iron		own	sol		36x7		mt	own	roller	Tim	no				
Martin	3-R	3		900		wood		own	sol		36x4		wd		fl-b	own	no		opt		
Martin	4-R	6		1200		wood		own	sol		36x6		wd		fl-b	own	no		opt		
Martin	L-4	6		1025		wood		own	sol		36x6		wd		fl-b	own	no		opt		
Martin	5-R	10		1,500		wood		own	sol		36x8		wd		fl-b	own	no		opt		
Martin	L-5	10		1,250		wood		own	sol		36x8		wd		fl-b	own	no				
Miami	120	1	395	none	no	rol-c		own	sol*		32x3		art	Stan	taper	Tim	no		bol		
Miami	124	3	820	none	no	rol-c	108	44	own	sol*	36x6		art	Stan	taper	Tim	no		bol		
Miami	123	2	665	none	no	rol-c	108	44	own	sol*	36x6		art	Stan	taper	Tim	no		bol		
Miami	126	6	1,350	none	no	rol-c	108	42	own	sol*	36x5d		art	Stan	taper	Tim	no		bol		
O. K.	2-T	2	550			rol-c	60	48		sol	34x5		wd		taper	Tim	no				
O. K.	3-T	3	750			rol-c	60	48		sol	34x5		wd		taper	Tim	no				
Ralston	V	2	380			rol-c	120	48	own	sol	34x4		wd	Sch	taper	Tim*	no				
Ralston	W	3	510			rol-c	120	48	own	sol	34x5		wd	Sch	taper	Tim*	no				
Reliance	X	5	600			a-iron	120	48	own	sol	34x6		wd	Sch	taper	Tim*	no				
Reliance	24P	2	400			p-stl		own	sol		34x4		art	own	taper	Tim					
Reliance	27P	3		580		p-stl		own	sol		36x6		art	own	taper	Tim					
Reliance	210T	5-6	1,250			p-stl		own	sol		36x10		wd	own	taper	Tim					
Reliance	220P	10	1,600			p-stl		own	sol		40x14		mt	own	taper	Tim					
Rogers	1-L	1				rol-c	192	72	own	sol	34x3		wd	H&D	roller	Bow	no		bol		
Rogers	2-L	2				rol-c	264	72	own	sol	36x5		wd	H&D	roller	Bow	no		bol		
Rogers	2-O	2				rol-c	120	72	own	sol	36x5		wd	H&D	roller	Bow	no		bol		
Rogers	3-O	3				rol-c	120	72	own	sol	36x6		wd	H&D	roller	Bow	no		bol		
Rogers	3-L	3				rol-c	264	72	own	sol	36x7		wd	H&D	roller	Bow	no		bol		
Rogers	5-L	5				rol-c	264	72	own	sol	36x6d		wd	H&D	roller	Bow	no		bol		
Rogers	7-L	7 1/2				rol-c	264	72	own	sol	36x7d		wd	H&D	roller	Bow	no		bol		
Rogers	10-L	10				rol-c	264	72	own	sol	36x8d		wd	H&D	roller	Bow	no		bol		
Samson	P-2	2	485	575		rol-c*		own	sol*				wd	St.M	taper	Tim			bol		
Samson	P-4	4	690	875		rol-c*		own	sol*				wd	St.M	taper	Tim			bol		
Samson	P-6	6	815	1,000		rol-c*		own	sol*				wd	St.M	taper	Tim			bol		
Samson	P-8	8	1,190	1,375		rol-c*		own	sol*				wd	St.M	taper	Tim			bol		
Samson	T-1	1	245			rol-c*		own	sol*				wd	St.M	taper	Tim			bol		
Samson	T-2	2	390			rol-c*		own	sol*				wd	St.M	taper	Tim			bol		
Samson	T-4	4	535			rol-c*		own	sol*				wd	St.M	taper	Tim			bol		
Warner	D-5	5	475			rol-c	40	44	own	sol*	36x4		wd*	Bim*	roller	Bow	no		bol	40 1/2	
Warner	D-10	2	600			rol-c	48 1/2	44	own	sol*	36x5		wd*	Bim*	roller	Bow	no		bol	48 1/2	
Warner	D-20	3	775			rol-c	51	45	own	sol*	36x6		wd*	Bim*	roller	Bow	no		bol	51 1/2	
Warner	D-30	5 1/2	1,025			rol-c	51	45	own	sol*	36x8		wd*	Bim*	roller	Bow	no		bol	51 1/2	

**ABBREVIATIONS—Types of Construction**  
\*with other options  
a-iron—angle iron  
auto—automatic brake control  
bol—booster  
dmp—dump  
exp—express  
fl-b—floating bushing  
h & f—hand and foot  
mt—metal  
opt—optional  
p & s—pneumatic and solid  
pl-c—platform construction  
pnu—pneumatic  
p-stl—pressed steel  
rol-c—rolled channel  
rol-l—rolled I-beam  
sol—solid  
spr—spring  
stk—stack  
stl—steel  
wd—wood  
wheel-f—front wheels  
wheel-r—rear wheels  
wheel-2—two wheels

**ABBREVIATIONS—Makers of Parts**  
wheel-4—four wheels  
with other options  
Bim—Bimel  
Bow—Bower  
Cnn—Cline & M. Mah  
Day—Dayton  
F. & H.—French & Hocht  
Gil—Gillman Mfg. Co.  
G. R. M.—Good Roads Machinery Co.  
H. & D.—Hoopes Bros. & Darlington  
Kel—Kelsey  
Ken—Kenesha  
M. W. C.—Motor Wheel Corp.  
Nor—Northern  
Park—Parker  
P. & B.—Parish & Bingham  
Roy—Royer  
Sch—Schwarz Wheel Co.  
Stan—Standard Wheel Co.  
Stb—Steel Steel Wheel  
Tim—Tucker  
Way—Wayne  
Wes—Western

## Semi-Trailers

MAKE AND MODEL	Tons Capacity	PRICE			Reversibility	Wheelbase, Inches	FRAME			TIRES		WHEELS		BEARINGS		BRAKES			BODY		
		Chassis Only	Complete With Body				Material	Length, Inches	Width, Inches	Make	Kind	Front	Rear	Type	Make	Type	Make	Fitted	Location	Medium	Type
Arcadia	260 2	570	extra.	no		58	rol-c.	144	46	own.	sol.	32x3 1/2	36x5	wa.	Way.	taper.	Tim.	no			
Arcadia	460 4	735	extra.	no		64	rol-c.	144	48	own.	sol.	36x5	36x5	wa.	Way.	taper.	Tim.	no			
Arcadia	660 6	900	extra.	no		70	rol-c.	168	50	own.	sol.	36x7	36x7	wa.	Way.	taper.	Tim.	no			
Automotive	2	725		no		84	p-stl.	120	36	P&B.	sol.	36x4	36x4	wa.	Day.	taper*	Bock*				
Automotive	3	870		no		84	p-stl.	120	36	P&B.	sol.	36x5	36x5	wa.	Day.	taper*	Bock*				
Automotive	5	1,115		no		100	p-stl.	168	36	P&B.	sol.	40x7	40x7	wa.	Day.	taper*	Bock*				
Automotive	7	1,275		no		100	p-stl.	168	36	P&B.	sol.	40x8	40x8	wa.	Day.	taper*	Bock*				
Automotive	10	1,550		no		100	p-stl.	168	36	P&B.	sol.	40x10	40x10	wa.	Day.	taper*	Bock*				
Automotive	15	1,750		no		100	p-stl.	168	36	P&B.	sol.	40x14	40x14	wa.	Day.	taper*	Bock*				
Bower	C 1/2	100	115				wood.	72	42	own.	opt.	28x2	32x2	wd.		roller.	Tim.	no		opt.	30
Bower	B 4	155	165	no			wood.	90	44			32x2	32x2	wd.	Stan.	taper.	Tim.	no		opt.	36
Byron	S-4 4						rol-c.	144	72	own.	sol*	36x6	36x6	wd.	Bim.	roller.	Tim.	yes	wheels.	hand.	stk.
Byron	S-6 6						rol-c.	168	84	own.	sol*	36x8	36x8	wd.	Bim.	roller.	Tim.	yes	wheels.	h&f	stk.
Eagle	ZZ 2	550		no		56	rol-c.	165	36	Amer.	sol.	32x3	32x3	wa.	War.	roller.	Bow*			opt.	
Eagle	ZZ 4	650				60	rol-c.	194	40	Amer.	sol.	36x4	36x4	wa.	War.	roller.	Bow*			opt.	
Eagle	ZZ 5	775		no		65		194	40	Amer.	sol.	36x6	36x6	wa.	War.	roller.	Bow*			opt.	
Fruehauf	S-230 3						rol-c.	192	72	own.	sol.	36x5	36x5	wd.	Roy.	taper.	Tim.	opt.	wheels.	hand.	opt.
Fruehauf	S-240 4						rol-c.	228	60	own.	sol.	36x7	36x7	wd.	Roy.	taper.	Tim.	opt.	wheels.	hand.	opt.
Fruehauf	S-250 5						rol-c.	192	72	own.	sol.	36x7	36x7	wd.	Roy.	taper.	Tim.	opt.	wheels.	hand.	opt.
Fruehauf	S-260 6						rol-c.	216	84	own.	sol.	36x8	36x8	wd.	Roy.	taper.	Tim.	opt.	wheels.	hand.	opt.
Fruehauf	S-280 8						rol-c.	216	88	own.	sol.	40x6d	40x6d	wd.	Roy.	taper.	Tim.	opt.	wheels.	hand.	opt.
Fruehauf	S-2100 10						rol-c.	144	48	own.	sol*	32x3	32x3	wd.		roller.	Bow.	opt.	opt.	h&f	opt.
Hesse	80ST 2						rol-c.	156	48	own.	sol*	34x4	34x4	wd.		roller.	Bow.	opt.	opt.	wheels.	h&f
Hesse	70ST 3 1/2						rol-c.	168	48	own.	sol*	36x6	36x6	wd.		roller.	Bow.	opt.	opt.	wheels.	h&f
Hesse	60ST 7						rol-c.	180	60	own.	sol*	36x8	36x8	wd.		roller.	Bow.	opt.	opt.	wheels.	h&f
Hesse	50ST 10						rol-c.	168	72	own.	sol.	36x6d	36x6d	wa.	St.M.	taper.	Tim.			stk.	
Highway	J-5 8-10	1,325	1,520				rol-c.	168	68	own.	sol.	36x7	36x7	wa.	St.M.	taper.	Tim.	yes	wheels.	hand.	stk.
Highway	H-5 5 1/2	885	1,000				rol-c.	168	60	own.	sol.	36x5	36x5	wa.	St.M.	taper.	Tim.	yes	wheels.	hand.	stk.
Highway	G-5 3 1/2	650	845				rol-c.	168	41	own.	sol.	36x3 1/2	36x3 1/2	wa.	St.M.	taper.	Tim.	yes	wheels.	hand.	stk.
Highway	F-5 2 1/2	495	690				rol-c.	198	41	own.	sol.	36x4	36x4	wa.	MWC.	taper.	Bock.			stk.	
King	S-23 3	730	815				rol-c.	198	41	own.	sol*	36x4	36x4	wa.	MWC.	taper.	Bock.			opt.	
King	S-45 5	865	950				rol-c.	192	41	own.	sol*	36x8	36x8	wa.	MWC.	taper.	Bock.			opt.	
King	S-68 8	1,100	1,200				rol-c.	192	41	own.	sol*	36x8	36x8	wa.	MWC.	taper.	Bock.			opt.	
Lapeer	N 9	1,475					rol-c.	192		own.	sol.	40x5d	40x5d	wd.	Roy.	taper.	Tim.	yes			
Lapeer	F 2 1/2	600					rol-c.	168	36	own.	sol.	34x4	34x4	wd.	Roy.	taper.	Tim.	yes	wheels.		
Lapeer	T 3 1/2	875					rol-c.	168		own.	sol.	36x6	36x6	wd.	Roy.	taper.	Tim.	yes	wheels.		
Lapeer	S 6	1,050					rol-c.	168	40	own.	sol.	36x7	36x7	wd.	Roy.	taper.	Tim.	yes	wheels.		
Martin	1 1		250	yes			pl-c.			own.	sol.	36x7	36x7	wd.		f-b.	own.	no		exp.	
Martin	1-Ex 1	250					wood.			own.	sol.	36x7	36x7	wd.		f-b.	own.	no		bol.	
Martin	2 1 1/2		385				pl-c.			own.	sol.	36x3	36x3	wd.		f-b.	own.	no		exp.	
Martin	2-Ex 1 1/2	385					wood.			own.	sol.	36x3	36x3	wd.		f-b.	own.	no		bol.	
Martin	3 3						pl-c.			own.	sol.	36x4	36x4	wd.		f-b.	own.	no		bol.	
Martin	3-Ex 3	650	50				wood.			own.	sol.	36x4	36x4	wd.		f-b.	own.	no		opt.	
Martin	4 4						pl-c.			own.	sol.	36x5	36x5	wd.		f-b.	own.	no		opt.	
Martin	4-Ex 6		800				wood.			own.	sol.	36x5	36x5	wd.		f-b.	own.	no		bol.	
Martin	5 10						pl-c.			own.	sol.	36x8	36x8	wd.		f-b.	own.	no		opt.	
Martin	5-Ex 10	1,112*					wood.			own.	sol.	36x8	36x8	wd.		f-b.	own.	no		bol.	
Martin	6 18						pl-c.			own.	sol.	36x8	36x8	wd.		f-b.	own.	no		opt.	
Miami	155 2	475	625	no			rol-c.	144	42	own.	sol*	32x4	32x4	wa.	Stan.	taper.	Tim.	no		stk.	46
Miami	165 3	840	1,015	no			rol-c.	168	42	own.	sol*	36x5	36x5	wa.	Stan.	taper.	Tim.	no		stk.	49
Miami	175 6	1,175	1,370	no			rol-c.	192	42	own.	sol*	36x6	36x6	wa.	Stan.	taper.	Tim.	no		stk.	50
Ralston	M 3	660		no			a-iron	168	40	own.	sol.	34x5	34x5	wd.	Sch.	taper.	Tim*	no			
Ralston	N 5	825		no			rol-c.	180	40	own.	sol.	34x5	34x5	wd.	Sch.	taper.	Tim*	no			
Ralston	O 7	1,050					a-iron	180	40	own.	sol.	34x7	34x7	wd.	Sch.	taper.	Tim*	no			
Reliance	28S 4	765					p-stl.	144	40	own.	sol.	36x7	36x7	wd.	own.	taper.	Tim.				
Reliance	212S 6	990					p-stl.	148	40	own.	sol.	36x10	36x10	wd.	own.	taper.	Tim.	yes	wheels.	hand.	
Reliance	216S 8	1,195					p-stl.	192	40	own.	sol.	40x12	40x12	wd.	own.	taper.	Tim.	yes	wheels.	hand.	
Reliance	220S 10	1,475					p-stl.	192	40	own.	sol.	40x14	40x14	wd.	own.	taper.	Tim.	yes	wheels.	hand.	
Samson	C2 2	410	485				rol-c.			own.	opt.	34x4	34x4	wd.	St.M.	taper.	Tim.			stk.	
Samson	C4 4	500	745				rol-c.			own.	opt.	36x5	36x5	wd.	St.M.	taper.	Tim.			stk.	
Samson	C6 6	740	895				rol-c.			own.	opt.	36x6	36x6	wd.	St.M.	taper.	Tim.			stk.	
Samson	C8 8	1,180	1,275				rol-c.			own.	opt.	36x8	36x8	wd.	St.M.	taper.	Tim.			stk.	
Shabolt	8*			no			rol-c.			own.	opt.	36x6	36x6	wd.	own.	roller.	Tim.*	no		opt.	
Trailmobile	P 1 1/2			no			rol-c.	168	39	own.	sol.	36x4	36x4	wd.	Stan.	taper.	Bock.			stk.	
Trailmobile	S 1			no			rol-c.	168	39	own.	sol.	36x5	36x5	wd.	Stan.	taper.	Bock.			stk.	
Trailmobile	T 6			no			rol-c.	168	41	own.	sol.	36x7	36x7	wd.	Stan.	taper.	Bock.			stk.	
Trailmobile	V 10			no			rol-c.	192	43	own.	sol.	36x5d	36x5d	wd.	Stan.	taper.	Bock.			stk.	
Trailmobile	P-D 2 1/2			no			rol-c.	213 1/2	57 1/2	own.	sol.	36x4	36x4	wd.	Stan.	taper.	Bock.			stk.	
Trailmobile	S-D 4			no			rol-c.	219 1/2	58	own.	sol.	36x5	36x5	wd.	Stan.	taper.	Bock.			stk.	
Trailmobile	T-D 8			no			rol-c.	221 1/2	57	own.	sol.	36x7	36x76								



# The COMMERCIAL VEHICLE

Read by Fleet Owners

Reg. U. S. Pat. Off.

THE CLASS JOURNAL COMPANY, Publisher

Horace M. Swetland, President  
 W. I. Ralph, Vice-President E. M. Corey, Treasurer  
 A. B. Swetland, General Manager  
 David Beecroft, Directing Editor  
 U. P. O. Building  
 239 West 39th Street, New York

## CONTENTS

Vol. XXV, No. 12 January 15, 1922

### LEADING ARTICLES

The Pacific Coast .....	7
Does Highway Transport Aid Railroads?.....	14

### MISCELLANEOUS ARTICLES

How British Buses Save Fuel.....	11
Trucks on Huge Construction Job .....	12
Big New Field for Truck Operation .....	16
Your Legs or Your Head? .....	17
Costs on a Record Truck .....	18

### DEPARTMENTS

The Better Way.....	20
Buyer's Department:	
New White Bus Chassis .....	24
Ruggles Brings Out New 2-Ton Model.....	25
New York Show Accessories.....	26
Shop Equipment for Fleet Owners.....	28
No Ice Problem With This Body .....	30
Motor Truck Electric System Wiring Diagrams...	31
The Fleet Owners' Forum.....	32
Editorial: Regulation of Bus Lines.....	34

### NEWS

Refuse Federal Aid Against Trucks .....	35
Erie Uses Trucks for Icebound Freight.....	35
New York Bus Owners Organize.....	36
Ohio Bus Owners Are Amalgamated.....	36
Direct Service Plan in Operation.....	37
Trucks and Buses Are Ruled Off Highways.....	37
Delivery Convention Plans Completed.....	38
Oregon Classes Bus as Public Utility.....	38

Index to Advertisers.....54-55

## The Commercial Vehicle

Charles W. Blackman, General Manager  
 EDITORIAL DEPARTMENT

Sinclair Gluck, Managing Editor  
 F. Eugene Spooner, Technical Editor

Published on the first and fifteenth of the month. Entered as second-class matter, September 13, 1906, at the Post Office, New York, New York, under Act of Congress, March 3, 1879

### BRANCH OFFICES

Chicago, Mellers Building, 59 East Madison Street  
 Detroit, 317 Fort Street West, Cleveland, 536-540 Guardian Bldg.  
 Philadelphia, 1420-1422 Widener Bldg. Boston, 185 Devonshire Street.

### SUBSCRIPTION RATES

United States .....	\$2.00 per year
Extra Postage west of the Mississippi River on account of Zone Postage Law .....	.50c
Canada .....	\$3.00 per year
Foreign Countries .....	\$4.00 per year

### ADVERTISEMENTS

Changes in copy for advertisements must be in the office of publication not later than 10 days before date of publication. Owned and copyrighted, 1918, by United Publishers Corporation. Address 243 West 39th St., New York. H. M. Swetland, President; Charles S. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

# ZENITH



## Truck Owners Send This Coupon

Zenith Carburetor Co.  
 Detroit, Mich.

Kindly furnish me with an estimate on the cost of installing a Zenith Carburetor on my \_\_\_\_\_  
 (Name and Model of Trucks)

Name \_\_\_\_\_

Address \_\_\_\_\_

## We Guarantee You These Savings

Zenith carburetors will save money, time and trouble in the operation of your trucks. They are guaranteed to add gasoline mileage, and power, and to make cold weather starting easy.

## 30 Days' Free Trial

To prove this we will install Zenith carburetors on any number of trucks in your fleet on a 30-day free trial. If you are not satisfied at the end of that time we will replace your old equipment and return your money.

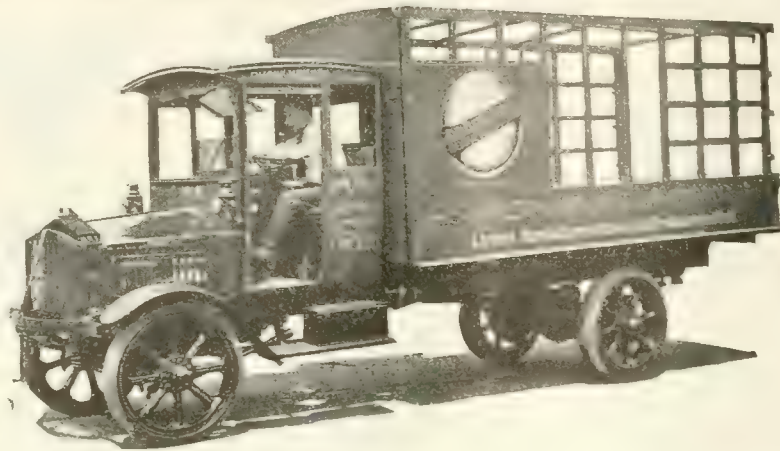
The cost of operating Zenith equipped trucks is uniform. Because Zenith carburetors are non-adjustable and drivers cannot tinker with them. Where drivers make adjustments, gasoline mileage often varies from 25% to 50%.

## Prompt Installations

Send the coupon. Our experts will make installations promptly. No interference to your business.

Zenith carburetors are used wherever economy and reliability under all conditions are the chief considerations. They are standard equipment on all Liberty motors, and practically all American, British and French planes. They are also more widely used industrially than any other carburetor—and are the choice of truck fleet operators.

**Zenith Carburetor Company**  
 Detroit, Michigan



## There Is Real Profit in the Hall Plan for the Fleet Owner

**U**NDER the Hall Plan, the fleet owner profits in two ways—

First:—He is enabled to buy trucks under an arrangement which recognizes his right to “better prices” by reason of his quantity buying. To begin with, here is a big start in the direction of more profitable haulage.

Second:—In the Hall, he gets a truck that can be depended upon to deliver unfailing service day after day at the low upkeep and operating costs only possible with a well designed and properly constructed haulage unit.

Every part of the Hall is nationally known and the engineering personnel of the Hall organization is long experienced.

These reasons combined make Hall the logical choice of those fleet owners who are interested in more economical transportation. The Hall Plan assures it, and whether you need additional equipment now or not, we want to put before you the complete details of this interesting proposition.

Write or wire us today.

*(Our dealers function in this Hall Plan under fixed arrangements.)*

**LEWIS-HALL MOTORS CORPORATION**

**DETROIT**

**MICHIGAN**

# HALL MOTOR TRUCKS



# *The* **COMMERCIAL VEHICLE**

*Read by Fleet Owners*

Vol. XXV Jan. 15, 1922 No. 12

## THE PACIFIC COAST

### *The Present Pacemaker of Automotive Transportation*

By Roy Alden

**A**UTOMOTIVE bus transportation in the states facing the Pacific seaboard of the United States is setting the pace for the entire nation. Serving a long-felt need, because of the absence of short line railroads, such as serve small communities in most of the Eastern States, motor buses have in a comparatively short time gained the position of an essential public utility and are being operated with the same degree of efficiency and regularity as other means of transportation. The so-called "curb" bus operator, with a "hit-and-miss" schedule, is rapidly passing by the boards and a co-operative spirit has developed among the individual operators or companies that is placing bus transportation in the West on an unusually systematic basis.

**W**HILE steamship companies and railroads in certain localities have been opposing the development of bus transportation because of the stiff competition the buses presented, public opinion appears to be wholeheartedly behind the buses. Where formal protests by rail and water transportation companies have been brought before state commissions vested with the regulation of transportation or public utilities generally, the buses have been almost uniformly successful in their fight for official recognition as an essential unit in the transportation system of to-day.

For the purpose of a close-up view of how auto-

motive bus transportation is developing in the West, the State of Washington may well be taken for study. In this State large buses, which for comfort and luxury are unsurpassed anywhere in the country, are found carrying passengers and transporting freight in virtually every community. Scores of districts are entirely dependent upon the automobile bus and many are the suburban tracts that have become dotted with new homes under campaigns waged by real estate firms whose success in gaining purchasers for their land and encouraging them to build was due in no small part to the efficient automotive transportation reaching their respective districts.

**A**S automotive bus transportation has been officially recognized as an essential public utility in the State of Washington, the bus services are under State regulation and supervision. All bus lines must obtain a certificate from the motor vehicle division of the State Department of Public Works in order to operate. Any one company that gives thorough satisfaction to patrons on any one line is free from competition, as the State Board will not issue a certificate to another line to compete on this route. This procedure is followed to eliminate cut-throat competition and to prevent the overloading of certain highways with buses when the patronage does not justify more than one efficient line.

# The Big Motor Bus Terminal That Put Bus Transportation on a Par with Railroads

ONE of the most notable developments in automotive transportation on the West coast is the recent establishment in Seattle of a central auto stage terminal that is without an equal anywhere in the country.

The union depot is the terminus for virtually all of the auto stages operating between Seattle and interurban points to the number of nearly 100 buses. The Central Auto Stage Terminal Co. has taken a lease on the full block occupied by the building, 240 by 100 feet. The building is located just off one of the three principal streets of Seattle, being just beyond the congested traffic district. This property consists of two stories and a basement. The entire building is occupied by the auto stages, their several companies, the concessionaires, waiting rooms and a public market.

## Separate Service Station

In addition to the depot proper, there will be a separate building for a garage, service station and clean-up room where the auto stages will receive care and attention after each trip and a thorough overhauling each week, thus assuring to the traveling public safety and sanitation in motor transportation. At the garage the stages will receive their repairs, oil, gasoline and tires at cost plus overhead.

More than \$35,000 has been spent in remodeling the depot property and about the same amount will be expended in finishing the garage, while it costs more than \$10,000 properly to equip the office, depot and garage.

The big outstanding feature of the terminal is the arrangement for discharging and receiving passengers. The loading and unloading platform is 200 x 10 feet, with gateways 20 feet wide at which the stages stand. The stages operate from under a marquee, the platform being in the building proper.

The fullest co-operation was received from the municipal authorities in centralizing the auto stages at this central depot.

## City Co-operation

The city authorities even permitted the removal of the sidewalk from the side of the property so the stages may run up to the building and the platform, and the passengers can thus be handled under cover. This arrangement permits of each stage pulling out of line and proceeding along its route without interference from,

or with other stages, in the loading line. By these methods, ten stages can be loaded every five minutes, day and night, without inconvenience to the public or the bringing of the automobiles into the depot building, thus eliminating all doors and leaving valuable space for high rentals.

Another feature of service in this terminal is the shopping service through which people living along the routes of the various stage lines may have their city purchases attended to and delivered by auto stage within a few hours. A capable woman is in charge of this shopping service and purchases ranging from small farming implements, overalls, cosmetics to threads will be attended to.



*This is Major H. R. Fay, organizer of the Union Depot and president of the Central Auto Stage Terminal Co.*

The women's waiting room is a two-compartment affair. The parlor has a lounging alcove where a woman, if indisposed, may retire for a rest while waiting for her stage. The general room has telephone desks with writing material for the convenience of the women desiring same, and sanitary drinking fountains, pedestal with a stand of gold fish, singing birds and flowers in bloom. The service rooms are finished in white tile and hard plaster. The union depot is the outcome and result of the vision of Maj. Herbert R. Fay, who, prior to becoming an emergency officer during the war, was the assistant adjutant general of the State of California under two governors, Hiram W. Johnson and William D. Stephens. During his war serv-

ice at various camps, Major Fay had much to do with automotive transportation.

## Growth of the Idea

One of the first problems with which the military forces were confronted in the division cantonments was the transportation of the men to the nearby cities. Immediately there sprang into being dozens of unrelated and partly irresponsible bus lines running into camp, giving a most inadequate and unsatisfactory service. Orderliness being one of the first requisites of military establishment, regulations were soon adopted requiring stage lines running into camp to congregate at a depot where military police were placed to see that they would leave on time.

To Major Fay the idea was at once suggested, if a terminal is good for a military camp with 30,000 or 40,000 inhabitants, how much more useful it would be in a city of half a million people. Seeing the remarkable development of auto stage services throughout the West, and especially in the State of Washington, he decided to interest himself actively in making public the urgent need of centralization. It was his opinion that while the auto stage had come to occupy a place in the transportation system of the West that could not be dislodged, the progress it was bound to make would be retarded by continuance of "curb" operating. Major Fay spent several months in Seattle gaining the confidence of the stage drivers, in interviewing city, county and state authorities interested in transportation matters, and in investigating various sites for the central depot.

## Property Value Enhanced

After receiving the fullest co-operation from the authorities, and the confidence of the stage drivers, Major Fay submitted a plan to Mrs. William-Anna Loring, of New York, owner of the building and site selected for the depot, by which the property owner and the stage drivers, with Fay as the "man-between," would conduct the terminal jointly, not on a strictly co-operative plan but on a plan similar to a co-operative undertaking. The property owner was convinced that the centralization of all auto stage transportation from her building would greatly enhance the value of the property to be occupied, and also adjoining property which she owns. After representatives of the stage drivers, and representatives of the property owner had spent





### Preliminary Sketches and Completed View of the Central Auto Stage Terminal

**Above**—An architect's exterior side view of the projected bus terminal at Seattle, Wash., showing the numerous windows in the handsome building. **Center**—Photograph showing the upper loading platform at the Central Auto Stage Terminal. To permit the buses to drive alongside the platforms under cover, the city authorities sanctioned the removal of the sidewalk. **Below**—Architect's sketch of the interior of the bus terminal. Passengers on the stages may purchase groceries, fruits, fresh vegetables, etc., at the stalls inside the terminal building. There are also restaurants, barber shops, a shoe repairing shop and other establishments in the building

several weeks going over the active plans for the union depot, a twenty year lease on the entire building was obtained and the Central Auto Stage Terminal Co. was organized. The division of interest in the undertaking is equal between the property owner and the stage drivers. Fifty per cent of the stock in the company was taken by the property owner and Major Fay, and the other 50 per cent was allotted to the stage drivers. Of this latter 50 per cent, about 35 per cent has already been taken up and the remainder is expected to be absorbed shortly. However, even if all the stock allotted to the stage drivers is

not purchased, this stock, although remaining unsold in the treasury, has full voting power in the company that is claimed by the stage drivers. In other words, the stage drivers are guaranteed 50 per cent representation. The stock was all sold on a capitalization of \$50,000.

#### Successfully Organized

Should any difficulties develop in the operation of the central terminal, Major Fay would loom as the arbiter, because the way he swings the voting power of his stock would decide any issue. So successful was Major Fay in gaining the

confidence of the stage drivers, as well as of the property owners, that the fifty-fifty plan was agreed upon by both sides without hesitancy.

There are five members of the board of trustees of the company, two representing the stage operators, two representing the property owner, and Major Fay. In addition there is an executive committee of stage operators consisting of five stagemen operating on five different lines who are stockholders in the company. This executive committee of the stage operators acts in an advisory capacity on matters regarding use of the depot by stage lines, depot charges,



The success of the union depot in Seattle is expected to be followed by the establishment of similar depots throughout the Pacific Northwest.



\*Electric railway and metro bus consultant.



# Trucks on Huge Construction Job

## *How the Trucks Were Speeded Up by Rails on Bodies, No Tailgates and Special Inclines*

**W**HEN a contractor is faced with an unusually big job, a job involving unusual difficulties, or both, nowadays, he does not go through sleepless nights of worrying how he can get the work done. He buys a few motor trucks, or puts the trucks he already has on the job, secure in the knowledge that the adaptability of the truck will enable him to put the work through in the specified time.

This fact is well illustrated by the experience of the Read-Coddington Engineering Co., contractors, engaged by the Niagara Falls Power Co., Niagara Falls, N. Y., to develop an \$8,500,000 power extension plan.

Under the arrangement made between the two companies, the contractors were faced with the problem last spring of excavating and hauling nearly 750,000 cubic yards of material, blasted from solid rock. Accordingly, the company decided upon motor trucks to do the job.

### Tremendous Project

The plan of the power company calls for the tunneling of a 4300-ft. underground aqueduct to convey a huge volume of water, drawn from the Niagara River far above the Falls, to the company's power house beyond the Falls on the lower side. The plans and specifications of the tunnel called for a fan-shaped inlet, sloping to a depth of 70 ft. at the upper end of the tunnel and a rectangular outlet, or forebay, 80 ft. deep, at the other end of it. The tunnel is to be trisected by two huge shafts, 10 ft. wide, 30 ft. long and 145 ft. deep. And these units, the inlet, the outlet and the tunnel itself are being blasted out of the solid limestone.

The tremendous volume of water which will flow by gravity through this tunnel from a point above the falls to a point on the top of the canyon wall, below the falls, will drop some 200 ft. down to the level of the water in the canyon and the tremendous power thus generated will be used to drive turbines. The same system is now in operation in the completed hydraulic plant of the company.

The flow of water in the new tunnel will be utilized to generate about 200,000 electric horsepower, an addition to the 265,000 horsepower now developed at the hydraulic plant of the company.

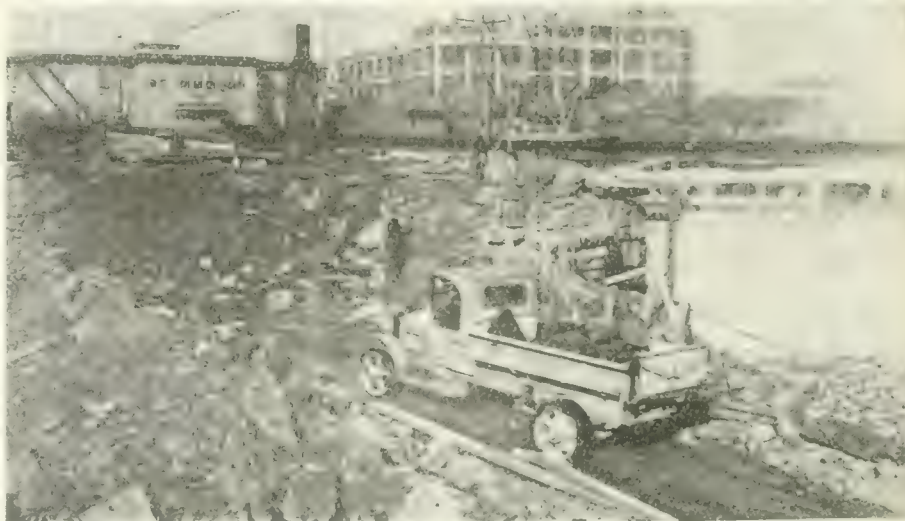
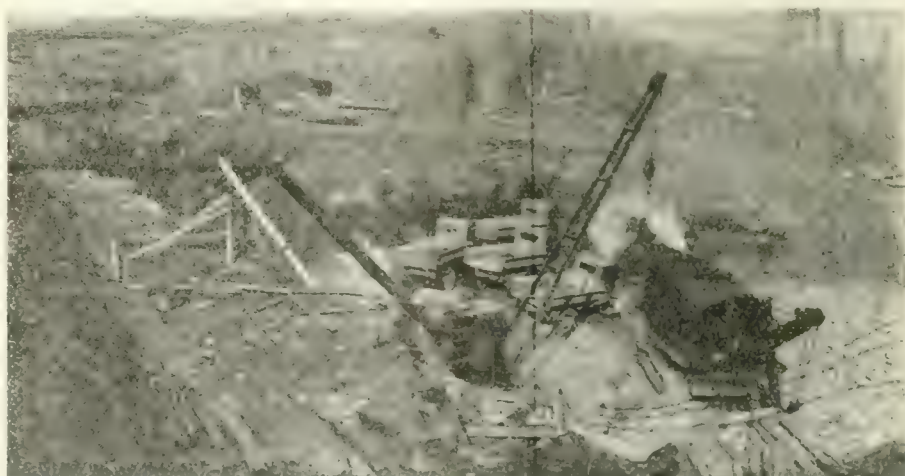
### Twenty Trucks Employed

After competitive tests, the contractors finally decided to install Pierce-Arrow trucks and accordingly a fleet of fifteen dual valve trucks of 5-ton capacity were purchased, equipped with 4-yard dump bodies. Later, five additional dual-valve units were added, making twenty trucks in all.

The new horizontal type of power hoist was specified. It is stated that the mounting of this type beneath the body gives more load room, for the body can be brought close to the cab.

The trucks are equipped with steel bodies. To brace these against the shocks of loading, 35-lb. steel rails—four to a truck—are fastened to the bed of the bodies. Moreover, these steel rails have greatly facilitated unloading, as the load slides off them more readily than off the floor of the body, when the truck dumps its load.

The excavation work was started on April 25, 1921, on the outlet. On this part of the work, 60,000 solid yards of limestone—equivalent to about double that in loose yardage—are to be removed. At the end of 6 months of work,



**Above**—The truck on the incline leading out of the outlet excavation is half way up the 12 per cent grade which leads onto the "level spot" shown at the extreme left of the picture. **Below**—The jagged boulders on either side of this incline show the nature of the rock which the trucks are required to haul.



about 45,000 yards had already been excavated, so rapidly has the work progressed with the trucks.

### Worked on All the Units

While work was being carried on at the outlet, the two tunnel shafts and the inlet excavations were also under way. During this work, an average of ten trucks served the shovel and the cranes at the outlet, while the remainder of the fleet was divided among the other points at which work was being carried on.

It was soon found, however, that at the speed with which the trucks operated the steam shovel could serve as many as twelve of the trucks at the outlet, although at times only ten were used. The haul is 2 miles long. Each of the trucks makes from eleven to thirteen trips a day, so that an average of 135 to 140 loads are hauled away daily. About two solid yards, or somewhere in the neighborhood of  $3\frac{1}{2}$  to 4 cubic yards of loose material are hauled on each load.

### Speeding Up the Work

When the trucks went into actual operation a close eye on them soon revealed several drawbacks and suggested several practical features which speeded up the work considerably. In the first place, tailgates were entirely dispensed with, for it was found that a full load could be carried by piling it at the forward end of the body and that the incline up which the trucks passed was not sufficient to cause them to spill material, even without the tailgate. Thus, a great deal of time is saved owing to the fact that the fastening and unfastening of the tailgate locks is entirely eliminated.

Moreover, the steam shovel operator works with greater freedom, for there is no danger of damaging the tailgates with the shovel.

Another device that has resulted in considerable economy of time and fuel is the method used in constructing the incline. To climb out of the pit, the trucks ascend a short ramp which has a grade of 20 per cent. This part of the haul is done, of course, in low gear. Then, for a short distance, the climb is one of 12 per cent which levels out, for 30 feet, into a grade of only a few per cent.

This method of construction gives the driver ample opportunity to shift from low to second gear preparatory to the final 250-ft. climb of 10 per cent. In other words, a "gear shift level" enables the trucks to gain momentum sufficient to make a faster ascent with a smaller expenditure of fuel. Thus, in spite of gear work on the incline and over the rough dumping ground, a fleet average of 4.5 miles per gallon of gasoline is maintained.

### Work Hard on Trucks

Although every effort is made to lighten the abuse to which the trucks are subjected, the contractors have found it impossible to avoid a certain amount of it. For instance, in loading a jagged boulder, weighing well over 5 tons, the steam

shovel will drop it as gently as possible onto the rear of the truck. And then, in order to place the load well forward on the truck the shovel will "bunt" it ahead. This operation shakes the truck as if it were a boy's cart.

Likewise they try to keep the surface of the pit as smooth as possible, but it frequently is bestrewn with rock and debris. It is not unusual for a truck to back over a rock the size of a barrel,

outlet so severe a testing ground. At the inlet the work is being done behind a coffer dam which locks out the river. About 50,000 solid yards of limestone—100,000 cubic yards of loose material—are being removed.

A group of four or five trucks is employed on the shafts which will pierce the tunnel. These trucks are worked double shifts most of the time. From the two shafts about 3000 cubic yards of



*Above—During the noon hour the surface of the incline is frequently touched up. At the extreme right is a section of the 20 per cent incline. Below—This shows how the load is placed well forward on the body, thus obviating the necessity of using tailgates. The steel rails which receive the impact of the load can also be seen here*

dropping off from it with a severe jar, or for a loaded truck to jounce over a heap of rough stones.

Breakage was expected, but at the end of 10,000 miles of operation, the contractors were surprised to find that the trucks had escaped the repair shop more than 90 per cent of the time. In fact, most of what little repair that was done was necessitated through accidental collisions.

To keep the trucks in adjustment and to facilitate emergency repairs, a chief mechanic and assistants are employed. Close attention is given to lubrication, it being the sole duty of one man to grease and oil the chassis systematically.

Difficulties encountered by the trucks which are working on the inlet excavation equal those which have made the

solid material are being removed. The material is hoisted in a bucket which drops a full load into a truck.

All the material from the tunnel likewise will be hoisted through the shafts with the exception of that which is being blasted from the tunnel intake and outlet. The intake and outlet are bell-shaped, narrowing from a diameter of 50 feet to 36 feet, excavation measurements. The actual diameter of the tunnel when lined will be 32 feet. About 350,000 loose yards will be removed.

"Would you again specify the trucks if you had to do the job over again?" Mr. Read was asked. "The best answer to that question is the fact that we purchased five additional units after we had given trucks a six-month trial," was the reply.



# Does Highway Transport Aid Railroads?

By A. J. Brosseau\*

I HAVE been asked to address you on the subject "Is Highway Transport an Aid to the Railroads?" I will confine myself to freight traffic and not discuss passenger transportation. Before answering the question I will remind you that highway transport in its broad sense means all transport over highways and streets, and that without it the railroads could not operate at all.

Aside from coal and other products of the mine that are transported entirely by rail and water, a very large part of the freight carried by the railroads is first transported over the highway as raw material and then again as the finished product. I assume you expect me to treat the subject with particular regard to the motor truck. In order to discuss the subject intelligently we must first of all ascertain why the motor truck is on the highway and define its field of operation.

## Trucks Saved Industry

It is only within five or six years that the motor truck has been an important element in transportation. It owes its present important position in transportation to the railroads which were unable to handle the enormous volume of freight traffic moving during the boom period of 1917 and 1920.

When the railroads became congested and declared embargoes and were blockaded for weeks at a time, manufacturers were faced with the alternative of shutting down for want of raw materials and supplies, or finding another means of transportation. They turned to the motor truck as a temporary substitute. It served them so well that they have continued to use it since the railroads have succeeded in clearing up the traffic jam after the present business depression developed a year ago. Merchants and farmers were also compelled to use the motor truck to move their merchandise and food stuffs, and they also have continued to avail themselves of motor truck transportation over the highways.

If you ask the question, "Did motor truck transportation over the highways help the railroads during the busy war years?" I am sure the answer will be "Yes." Without the motor truck, transportation would have broken down utterly. Many industries would have been seriously embarrassed, and the country would have faced the possibility of hunger.

No one who is at all well informed regarding traffic conditions during 1917-1920 will deny this. On the contrary, they will agree that the motor truck was a great help to the railroads during this period. It served the public also.

As you all know business has been poor for the last year and the railroads can now handle all the traffic that offers.

We are asked if the railroads are now helped by the motor truck. My answer is "Yes," for business is going to be good in the near future, and when it is the railroads will again be unable to handle the traffic. We shall then have delayed shipments, embargoes, blockades, and the truck will again save the situation for the railroads and for the public. It may also save the railroads from the fate they so narrowly escaped during the last traffic jam—permanent government ownership.

If the motor truck is eliminated now and is not available when the next boom is upon us, the railroads will fall down so hard that government ownership advocates will have an excellent argument to prove that the government should take over the railroads. If it saves us from government ownership of the railroads, the motor truck will again have justified itself. In addition to the service the motor truck renders to the railroads and the public during times of stress, such as I have described, it is an aid at all times to an even greater degree—as I will proceed to explain.

## Trucks Up to 50 Miles

Motor truck highway transport is the most efficient agency for moving LCL package freight for distances up to approximately 50 miles. The reason for this is that in all large cities terminal charges are very high and amount to more than the railroad rate for short distances.

Edward Hungerford, an authority on rail freight transportation, asserts that "old time railroads for years past have said that a freight car did not begin to make money until it had hauled its goods at least 40 miles; to-day the modern generation of operators will come nearer to putting this figure at 80 miles. Up to a distance between these figures—and undoubtedly far nearer 80 than 40—the vast terminal charges of the American railroad nullify the profit of the haul itself. This is a principle of rail transportation so well understood by all competent authorities to-day as to be open to no dispute whatever."

The short-haul traffic of the railroads has not been and is not to-day profitable. The railroad executives themselves acknowledge it. I have only to-day to quote the prophetic words of Elisha Lee, Vice-President of the Pennsylvania System, to substantiate this. "To the extent to which motor vehicles are likely to take over the short-haul freight traffic the railroads will probably be immediately benefited financially, because short-haul business is becoming increasingly unremunerative on account of the high proportion of terminal costs which it must sustain."

The motor truck aids the railroads in still another way. Several years ago James J. Hill got front page publicity by the statement that the railroads needed \$1,000,000,000 a year for terminal facilities. I understand that all well informed railroad men admit that the greatest problem they have to-day is inadequate terminal facilities.

I do not know the exact proportion of the existing terminal facilities needed to handle LCL package freight moving less than 50 miles, but we are all sure that it is a very considerable part of the whole. It may be one-half, or one-quarter, but whatever it is, it should not be devoted to the handling of the non-profitable LCL package freight that can best be moved by motor trucks. And again, if the railroads were relieved of this non-profitable LCL package freight, the terminals would then be ample to handle the long distance freight. The railroads would not need \$1,000,000,000 a year for additional terminal facilities and would have enough equipment to move all long distance freight, even during boom times. That is the answer to the question, "Is Highway Transport an Aid to the Railroads?"

## Railroads Admit Truck's Place

We all agree that the motor truck has a place in the transportation scheme. Even the railroads admit it, if we accept their idea of the economic radius within which it should operate. Why not permit the shipper, the farmer, the public, to decide the economic radius—whether it be 50 miles or 100 miles—or more. As a matter of fact, the public, and not the motor truck owner, or the railroad will decide how far highway transportation may be developed.

As the matter stands the public is supporting over 600 motor express lines operating for varying distances up to 150 miles.

Many of you, undoubtedly, have used motor truck highway transport in moving LCL package freight to points in Connecticut, southern New York, New Jersey and Pennsylvania. You know the advantages of over-night door-to-door delivery.

You, and your customers, can testify as to whether the motor truck has a place in the transportation scheme.

With the permission of the Chairman, I will quote from an address delivered by a traffic expert, Mr. W. J. L. Banham.

"Users of motor trucks should consider to what extent they can be operated in cooperation with railroads for short-haul freight movement. The principles involved are: First, service; second, cost.

## Loss on Short Haul Work

"There seems to be no question at the present time that the carrying of less than carload shipments to short-haul points by the rail carriers is not only expensive to the shippers, but is also unprofitable to the carriers. Until recently it seemed to be almost necessary for the shippers to use the rail carriers for the movement of their less than carload shipments to nearby points, regardless of expense and delay, as there did not seem to be any organized effort made by the motor truck operators to take care of this class of freight.

"It is extremely difficult for carriers to figure cost of transportation of pack-

\*Address delivered at Merchants' Association before the Shippers' Conference of Greater New York, Jan. 10, 1922. Mr. Brosseau is president of the International Motor Co.



age freight hauled short distances and particularly to such points at which they do not have a through car movement. The expense of transferring the less than carload shipments one or more times when moving within fifty miles of the receiving station, and the additional expense caused by the delay of equipment, has been recognized by the Government, with the result that the U. S. Railroad Administration during the war ruled that freight destined within a certain radius would not be handled by the rail carriers. It was necessary, therefore, for the shippers to find other means of transporting this class of freight. Motor truck transportation, while still in its infancy at the present time, pointed a way to the shippers whereby their less than carload shipments could be handled not only more promptly, but at a considerable saving both to the shipper and to the receiver of freight alike.

"While it is true that it is almost impossible for the carriers to figure the exact cost of handling short-haul freight, it is equally as difficult for the shippers to ascertain the cost of transporting similar freight. The question of cost brings me to the first part of my subject, and in order to make it clear as to what I mean by costs and what these costs cover, I am going to refer to them as transportation costs. Transportation costs do not necessarily mean less than carload freight rates and motor truck rates, although both rates are a part of the transportation costs.

### Must Include All Items

"What I understand to be a true transportation cost is all expense involved in making a shipment, starting with the boxing, or packing expense, together with handling expense in the shipping department, the loading of freight on teams for delivery to the freight house, teaming charges from the shipping department to the local freight house, and additional labor incidental thereto. To this must be added the less than carload freight rate and additional charge for cartage at the delivery point, with such other expenses as may be caused by requests for tracing, duplication of shipments lost or damaged in transit, entering of claims, checking of freight bills, delay to shipments in transit, and the expense of carrying additional stock to take care of freight in transit when moving via rail carriers.

"All of these costs are properly transportation costs, and are a part of the shipping expenses which are paid either by the shipper or receiver."

The advantages of motor truck highway transport are not confined to this locality. The motor truck is as much a part of the transportation scheme in New England, in the industrial Middle West, and on the Pacific Coast, as it is here. The farmers who own 150,000 motor trucks, and transport approximately 150,000,000 tons of freight a year with them, receive perhaps the greatest direct benefit of any user of motor trucks. With the farmer, in a great many instances, it is not a case of reducing his transportation cost, but of saving the entire value of his crop.

I have told you how, without co-operation, the motor truck can, and does, help the railroads, how the motor truck reduces the cost of transportation to the public, but the half is not told. If the motor truck and the railroad will co-

operate by working together, they will not only help one another, but will help the public to an even greater extent. Gerrit Fort, vice-president of the Boston and Maine Railroad, says, "What railroad men should study is the best way to co-ordinate their own facilities with those afforded by this new factor in the field of transportation." (Address before the Associated Industries of Massachusetts at the Hotel Copley Plaza, Oct. 27, 1921.)

The railroads entering Cincinnati have recently worked out a plan of exchanging freight by means of motor trucks. Great gains have been made in the way of releasing cars for main line service, relieving the terminals of congestion, expediting the movement of freight, cutting the cost of handling nearly one-half.

### Railroads Use Trucks

I have no doubt that the railroads will generally use the motor truck when it can be shown that such gains are possible, and that the savings, because of lower operating cost, will be passed on to the public in the shape of lower freight rates.

The New York Central lines have recently come forward with another installation of a slightly different type, the railway container car. The car is a nine-section express car; its sectional cargo space consists of nine separate containers, which are firmly locked during transit to avoid shifting. Each container, with an average capacity of 6000 pounds, is removable, so that it may be carried by motor truck direct to the door of the consignee. When you further consider that a certain percentage of all package freight shipped by rail and express is tampered with, the importance of having these container units built of substantial steel, which can be unlocked and locked only on the premises of shippers, is apparent at once.

It is generally expected among conservative critics that the railway container car system will eventually mean another great step in the complete co-ordination in this country of the railroads and highways.

I believe you will agree with me that the next great development in transportation in this country will be a national delivery service for picking up traffic at the point of origin and making delivery at the store-door of the consignee, at the point of destination. The motor truck offers the best solution of this problem in the opinion of many railway officials.

Only last week the Erie Railroad in the interest of saving transportation charges and solving the water front congestion problem inaugurated the transportation of freight between the New Jersey rail terminals and New York City by means of trucks. According to J. J. Mantel, manager of the Erie lines in New York, this system, which was instituted with a fleet of sixty-eight trucks and two inland receiving stations in Manhattan, will be gradually developed into larger proportions.

### Motor Express Lines

President Harding said, just before he took office, "We must foster the use of motor trucks and build urban terminals for truck service to make new ties between communities and between city consumption and country production."

This movement is already in progress in many of the larger terminal centers,

like New York, Rochester, Buffalo, St. Paul, Los Angeles, and other cities. Radiating out from these terminals is a vast network of intercity motor express lines. It is my understanding that you have at your disposal over a score of such organized companies in your own territory here in Greater New York. Service is the fundamental characteristic of such operations and shippers in general appear to be glad to pay for it.

In this enunciation of the general principles surrounding highway transport service, I have purposely neglected to mention the individual truck equation until now. In the opinion of E. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express, "the maximum daily horse mileages in heavy and medium heavy haulage are 20 and 24 miles respectively. The average is not much more than half this—12 and 14 miles. A motor truck can cover from 30 to 100 miles a day readily, although it is seldom as low as 30, and not often above 60; the average is below 40.

"There is no limit to the motor truck's endurance; it is simply a question of drivers. This is advantageous during rush season or at rush times of the day or month, since no extra delivery service need be rented or otherwise provided for."

All through this discussion I venture to say, you have been turning over in your mind the question as to whether or not motor trucks, recognizing their fundamental necessity in our economic structure as an aid to the railroads, are paying their just proportion of highway construction and maintenance.

Senator Charles E. Townsend, Chairman of the Senate Committee, on Post Offices and Post Roads, recently declared on the floor of the Senate that "there is no more reason why trucks should be taxed than freight cars separately because they are engaged in a business which is of the utmost importance. Trucks are in almost daily use. They are taking their place everywhere, and I think their use ought to be encouraged.

### Taxes Paid by Trucks

"Automobiles and automobile trucks pay, perhaps, a heavier tax than is paid by the various implements used by the people. They are practically supporting the roads; they are maintaining the roads and in some of the states they are building the roads by the taxes that are put upon them."

The operators of motor vehicles are willing to meet the cost of road maintenance and are doing so, as Senator Townsend's statement just showed and as is substantiated by revenue analysis. In 1920 the motor vehicle fees amounted to \$102,546,212, of which only \$59,414,039 was spent for maintenance of highways under the supervision of State Highway Departments. In 1920 motor vehicles paid in Federal taxes alone \$148,720,800. President Harding, in his first message to Congress, said "The highways are not only feeders to the railroads and afford relief from their local burdens, they are actually lines of motor traffic in interstate commerce. The motor car has become an indispensable instrument in our political, social and industrial life."

The investment of the people in good roads is essentially, therefore, a declaration of faith and vision in the prosperity

(Continued on page 27)



# Big New Field for Truck Operation

*Trucks and Tractors Are Making Vast Stores of Natural Wealth Available in the "American Desert," in Places Where Other Forms of Transportation Cannot Penetrate*

IN this period of slow movement of tractors, and careful buying of motor trucks, a new, extensive and promising field, of an area equivalent to almost one-third of that of the United States, has just been opened to the fleet operator of trucks and tractors, and to the transportation and distribution experts and engineers. This is the American desert, especially that part of it which lies in Nevada, Utah and California.

Part of this opening up of the Great American Desert, especially at its northern end, is due to the plans of the new \$25,000,000 coal, coke, iron and steel merger, recently completed, which is combining the raw materials of Utah's mines with the steel mills on the Pacific Coast.

But by far the greater and more important introduction of motor trucks and tractors to the desert has just been done—and is still being extended—by the West End Chemical Co. of Oakland, Alameda County, Cal., with its plant at West End, San Bernardino County, Cal., and its mines at Muddy Mountain, Nev.

## Desert Wealth

This corporation, which has just discovered through its explorers a mountain containing 300,000 tons of Colemanite (borate of lime), has been able to develop its property, carry its crystalline ores to the mills, and to the railroad, solely through the operation of a fleet of road tractors, tractors and motor trucks.

Through its example, other mines in this section, which have been unable to reach maximum production and, very often, any production at all, by means of mule-drawn transportation, are turning to the truck and the tractor, especially the road tractor, following the example of the West End Chemical Co.

Formerly all the borax obtainable in the world was formed by evaporation, in the shape of borate of sodium, on the surface of the dry lakes in the desert, but recent explorations have found that there are veins of undissolved borate of lime crystals in some of the desert mountains, just as there are "mother lodes" of gold and silver, from which "float ore" is found. This form of borate of lime is called Colemanite, in honor of the chief of one of the early organizations of Vigilantes in California.

These deposits are located literally "high and dry" in the deepest, driest parts of the desert. On account of the

mountains, the cost of rail-laying for trains is prohibitive; because of the lack of water, even the famous twenty-mule teams of the old days on the desert cannot reach these deposits; then, in rolls the tractor, laying for itself a track, and carrying building materials and machinery and men into the mine, as well as taking out the ores. Neither water nor rails mean anything to this "mountain-walker" as the Nevada Indians call the

team, were designed to haul ten tons, or half the capacity of the average freight car of to-day. That is, a train of two of these wagons, drawn by a score of mules, carried the full load of a modern freight car, and carried it, not over smooth steel rails, but up and down rocky canyons and slopes, on which, in most instances, there was barely a trail, far from a road. Because these were probably the largest wagons, or "trailers" ever used, and were completely successful up to their limits of hauling water for men and mules, a description of one of them, now nearly extinct, will be of interest to all those interested in transportation.

The hind wheels were seven feet in diameter, the tire eight inches wide and an inch thick. The front wheels were five feet in diameter with a tire of the same size as the rear wheels. The hubs were 18 inches in diameter by 22 inches long. The spokes were made of split oak, five and one-half inches wide at the butt and four inches wide at the point. The felloes were made double, each piece being four by four inches in cross section, and the two bolted together.

The forward axle-trees were solid steel bars, 3¼ inches square, while the rear axle-trees were 3½ inches square. The wagon beds were 16 feet long, 4 feet wide and 6 feet deep. The tread was 6 feet. Each wagon weighed 7800 pounds and cost approximately \$900. The modern freight car weighs 27,000 pounds and carries 40,000 pounds; the train of two of these wagons weighed 15,600 pounds and often carried 45,000 pounds, or nearly three times their weight.

## Old Method Dropped

The road tractor, however, with its steel wagon trailers, has completely driven the 20-mule team and the largest wagons in the world from the trails of the desert, and it remains for the truck and tractor builders and operators, and the transportation and distribution engineers to fill this field with their automotive vehicles, following the opening given them by the West End Chemical Co., and also adding to the prosperity of the world by bringing transportation to the vast deposits of ores in this desert, which are now unavailable because of lack of this very transportation and distribution system and means.

There is a big new field in these undeveloped regions for the truck and tractor and big opportunities for business men.

## The Truck and Its Uses

The motor truck has stepped into many well established businesses and extended their scope.

The truck has developed new types of successful businesses which have increased the national **wealth and given many lucrative employment.**

The truck has increased land values.

The tractor also has increased land values and has extended the scope of the farmer, increased the land under cultivation, and made farming more economical.

Now the truck and the tractor are opening up vast new fields of natural wealth.

But the whole scope of neither the truck nor the tractor is yet realized or discovered and the future is the brighter for both on that account.

## Are You Looking Ahead?

tractor, and the result is the rapid opening of the most inaccessible parts of the desert.

Whether it was due to the activities of the Linn road tractor salesmen and demonstrators, or due to better work performed by the tractor itself cannot be said, but the West End Chemical Co. has been able, as a result of their use to do away with the 20-mule teams, which its president, the famous "Borax" Smith, nearly 50 years ago put into the desert to haul borax from the dried-out lake beds of Nevada and California. Comparative descriptions of the wagons once used by these teams, and the road tractor, may be of interest.

## Wagons Formerly Used

The wagons, two of which were drawn, with a water tank, by every 20-mule



# Your Legs or Your Head?

By  
Sinclair Gluck



THE president of the big commercial house did not look up immediately as the young fellow walked up to his desk. Old Hammerhead, as his men called him, had a knack of putting his men at their ease when he sent for them. He liked to talk to each one of them from time to time, about their work. And these talks, pleasant as they were, stimulated the men more than they realized. Nor did they realize how the president got them to talk so readily and so pleasantly.

But although the old man did not look up immediately, he was studying the newcomer out of the tail of his eye, marking his nervous attitude, the way his hands were opening and closing, and his general air of uneasiness. So, when the old man finally glanced up, his smile was genial and friendly to a degree that brought an answering smile from the younger man.

"Well, Turner, how has everything been going with you in your new work?" he asked.

Turner was a new mechanic, just out of school, and Ross, the garage superintendent, had taken him on recently as an assistant to one of the older mechanics, until he could try him out and put him onto regular work. One or two of the men had told him that he would have to talk to the president sooner or later and had painted the old man in lurid colors. So Old Hammerhead's opening remark left the young fellow very much at a loss.

"Pretty well, sir," he stammered.

Old Hammerhead nodded pleasantly. "I got the impression that you were getting on well from Ross," he said. "And I wanted to have a talk with you on my own account because I like to keep in touch with the men who make up my business family. I feel that all you fellows are just as much my responsibility as my own family, and I am just as pleased when you get on well and just as sorry when you don't."

The old man laughed suddenly. "I like to talk to the men from time to time, too, to get a line on how things are going with them and sometimes I am able to help them along a little with suggestions. I had a little story in mind that I thought of repeating to you, but before I do so, I want to ask you a question. Have you ever worked in a circus?"

Turner looked at Old Hammerhead a though he had seen a ghost, and the

old man laughed suddenly at the sight of the other's open mouth.

"It's all right, Turner. There's no particular significance to that question except one that you will understand in a moment. But I'd like to know the answer."

Turner shook his head. "No. I never worked with a circus, sir."

"All right," Old Hammerhead nodded. "Now here's the story."

"When I was a young fellow, my dad decided that things were getting a bit too strenuous around the house with me in it. So after a lot of consulting it was finally decided to send me to a military school.

"I thought that was pretty fine, Turner. I had an idea that I'd like strolling around in a uniform, especially when I came home for my vacations. And the uniform was about all that occurred to me in connection with my coming schooling.

"But when I got to the school, finally, I realized that there was a lot more to a military school than just strolling around in a uniform. I realized that some of it was not so pleasant nor so easy as I had supposed. And I found out one feature, not particularly pleasant, very soon after I got there.

"We had an old regular army bugler attached to the school. The old fellow was way over age for work with the army, but he did excellently for getting us up in the cold gray dawn and summoning us to drills and so on. And the old man had an overdeveloped sense of humor.

"Anyway, he found me wandering around the campus up by the upper school. A big flagstaff stood in front of the main building there. And the campus stretched away for a good half mile, down to the lower school.

"This old fellow called me over to him in a great hurry. 'Look here, young fellow,' he said. 'Here's a chance for you to do something big for the school. That flag up there is lowered at six every night, as you know, and raised again in the morning. We've never missed a night or a morning since the

school began. But to-day old Collins down in the gun room forgot to send up the keys to the flagstaff. And unless I get them up here within ten minutes, the tradition of the old school will be broken. Do you think you can do it?'

"Well, of course, I was all excitement," Old Hammerhead went on. "I jammed my hat on without a word and took off down the campus as fast as I could run, for I knew just where to find old Collins. And I never once looked back."

Old Hammerhead broke off and laughed. "Well, Turner," he said, "I wish you could have seen the face of that old man when I asked him for the keys to the flagstaff. 'What, another?' he shouted. 'There's one born every minute. You run back as fast as you can and tell the bugler that I'll send him the keys of the flagstaff just as soon as he returns me the electric light snuffers I lent him.'"

Turner laughed outright and the old man smiled and nodded. "Yes, Turner, it was just there that I saw the light, too. I turned around and walked back up the campus. And when I got up there the evening gun had been fired and the flag lowered, and there were at least fifty-six fellows waiting to ask me why I hadn't made better time with the keys. They never did let me forget it.

"But, Turner, right there was where I learned to use my head first and my legs afterwards. For I decided that it was easier to do a little thinking than a whole lot of running. Of course, in a circus they want you to develop your legs. But anywhere else, almost, it is a good deal more important to develop your head.

"This is not intended as a reflection on your work, Turner. For I believe that it is good and that Ross is pleased with it. But when I was passing through the shop the other day I got the impression that your method of doing things was a little haphazard, like the plumber who always turns up without the right tool and has to go back and get it. So I thought, knowing that you are pretty near as young as I was, that the story might interest you!"

# Costs on a Record Truck

## Truck Earned \$2,000 Profit in 27 Days

The Costs Laid Out Below Cover a Period of 18 Months During Which This Construction Truck Made Big Profits

THERE have been many examples of high profits earned with motor trucks. But the profit earned by the 3½-ton truck described in this article is a record so far as the writer knows. For the truck earned \$2,000 in 27 days.

The cost of operating the truck over a period of a year and a half, are shown on these two pages, laid out on sample sheets of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks.

Of course, the big earning achieved above was not maintained throughout that period, but the truck proved a consistently good investment throughout, and for that reason the costs of operating the truck are of double interest and should be carefully analyzed.

But before going into the matter of the costs, a record of the truck's performance will be of interest.

### The Work It Did

The truck was purchased by C. A. Harrington of Minneapolis, Minn., in December, 1919. Since that time it has been pretty steadily employed on road building jobs, with occasional jobs of excavating. Most of the work has been done in the State of Minnesota and a great deal of it in the northern part of the State, where the truck was often obliged to work with snow on the ground.

During the 18 months the truck has been in operation, it has traveled over 15,000 miles, averaging about 55 miles a day. On one road building job it averaged over 80 miles a day for 4 months and on one particular day it traveled 126 miles in 10 hours and hauled 248 yard-miles of gravel. Of course, the hauling conditions were ideal on that occasion, the truck had no waiting, either in loading or unloading, and the roads were good. On that day, the truck hauled eight loads of 4 cubic yards each a distance of 7¾ miles.

### Work Is Hard on Trucks

As a general rule, road building is very hard on a truck. The season is short, so that the truck must work overtime and carry heavy overloads. And the roads are usually very bad. The truck was operated on an average of about 180 days in the year. The cost of operation, figured out on the sample

sheets shown on these pages, works out at \$19.76 per day operated, including the driver's wages. This gives a cost of \$.3477 per mile operated. The actual

repair costs for the 18 months were \$426, including an overhaul of the engine.

Mr. Harrington has these details to give as to the truck's performance:

The Commercial Vehicle—Truck Cost System			
1½ year or Month ending <u>May 1</u> 192 <u>1</u>		Gasoline <u>Acme</u>	
Make of truck		Gasoline <u>Acme</u>	
MONTHLY COST SUMMARY SHEETS U. P. C. BOOK COMPANY, INC. 243-249 WEST 39TH ST. NEW YORK			
<b>Operating Charges</b>			
Gasoline	4213 gals.	@ 2.7¢	\$ 1137.51
Current	— kw.h.	@ —	
Oil	448 qts.	@ 17½¢	78.40
Grease	— lbs.	@ —	
Kerosene	— gals.	@ —	
Waste	— lbs.	@ —	
Dist. Water	— gals.	@ —	
Driver	278 days	@ \$5.50	1529.00
Helper	— days	@ —	
Mechanic	— hrs.	@ —	
<b>A—Total Operating Charges</b>			\$ 2744.91
<b>Maintenance Charges</b>			
*Tires	15,800 miles	@ \$.0377 per mile	\$ 595.66
Repairs	Estimated @ \$.0269 per mile		425.00
Overhauling, painting, etc.			
Spare vehicle rental			
Garage rental (pro rata) @ \$10 per month			180.00
<b>B—Total maintenance charges</b>			\$ 1190.66
<b>Fixed Charges</b>			
Insurance, fire	@ \$93 per year		\$ 139.50
Liability	@ — per year		
Collision	@ — per year		
Interest	6% (On Item 1—12)		286.88
Depreciation on chassis	@ \$.0715 per mile		1129.70
Depreciation on body	@ —		
Depreciation on equipment	@ —		
*Depreciation on tires	@ —		
Total taxes and licenses @ \$1.67 per year			2.50
<b>C—Total fixed charges</b>			\$ 1558.58
			5494.15

\*Note: Omit one of these.

On this sample sheet of THE COMMERCIAL VEHICLE Standard Cost Keeping System for Motor Trucks are given the various charges listed against the record truck during its first 18 months of operation. The costs are not unusually low, showing that no attempt was made to economize on necessities. But the only item that is unusually high is the repair cost, which is the actual amount it cost. Over \$400 is high for the first year and a half of operation. But construction work is very hard on trucks



"When working in the country on sandy roads, I get only about 2 miles per gallon of gasoline. On city jobs I have got as high as 6 miles per gallon. It all depends on the work and the condition of the roads. A fair average for the 18 months is 3.75 miles per gallon of gasoline. An average on the oil would be about 140 miles per gallon.

Mr. Harrington goes on to speak of the record hauls performed by the truck.

"On the day when I hauled 248 yard-miles, the cost was:

Variable expense .....	\$26.84
Fixed expense .....	2.19
Driver's wages .....	5.50

Total expense .....\$34.53

"That day I hauled about 32 yards, making the cost \$1.08 per yard and 14 cents per yard-mile.

"I have hauled as many as twelve loads of 4 yards each a distance of about

### Cost Keeping for All

The Standard Cost Keeping System for Motor Trucks, published by THE COMMERCIAL VEHICLE, has always been sold at cost price.

But now, in order to enable fleet owners new to the industry to install an accurate cost keeping system at the lowest possible cost, the price of the system has been still further reduced.

The entire system now sells for \$7.50, instead of \$12.50, as before.

### This Is Your Chance!

2 miles, traveling about 50 miles during the day. The cost of operation on such a day is:

Variable expense .....	\$10.65
Fixed expense .....	2.19
Driver's wages .....	5.50

Total expense .....\$18.32

"As the truck hauls 48 yards of gravel, the cost is 38 cents per yard and 19 cents per yard-mile.

"Before buying my own truck, I ran the first Acme dump body truck in this place, and I never heard of a truck of any make which hauled as many yard-miles per day as mine did.

"In 27 days, my total earnings with this truck were \$2,640. Taking my present average cost of \$19.76 per day as a basis, my profits were over \$2,000. On the day I hauled 248 yard-miles, I received 40 cents per yard-mile. My earnings on that day were \$99.20 and my profits \$64.67!"

### Cost Figure Analysis

An analysis of the cost figures is of interest in connection with the above. Such an analysis shows that the truck operator has not been penny wise and pound foolish and tried to economize on items, the neglect of which is anything but economical. The oil used was not excessive, for the period, but as the truck worked only 278 days out of a total of 540 days, for the period, the amount of oil used should have been amply sufficient.

Moreover, the owner of this truck has paid his driver well and that should mean that he has been able to get and retain an efficient driver, which means an ultimate economy both in operation and in maintenance. For nothing sends up both operating and maintenance costs like an inefficient or careless driver.

### Recapitulation Figures

The remaining charges are more or less fixed, the tire and chassis depreciation figures being based on the original cost of the tires and of the chassis, and the repair, garage, license and interest charges being more or less unvarying.

As the second cost sheet shows, the truck was operated a total of 278 days out of 540 days, ran about 2214 hours, covered 15,800 miles, made about 1390 trips and hauled a total of about 5560 cubic yards.

Coming down to performance averages, the truck averaged 29.26 miles during the 540 days maintained, averaged 55 miles per day operated, averaged 11 miles per trip, 4 cubic yards per trip and 22 yard-miles per trip.

The final figures show the total expenses for the period to have been \$5,494.15, the cost per day operated to have been \$19.76 and the cost per day maintained to have been \$10.17.

The cost per mile operated works out at \$.3477. The total cubic yard-miles is 30,580. And the cost per cubic yard-mile for the entire period works out at \$.1797. It must be remembered, however, that these are average figures for the period.

### The Commercial Vehicle—Truck Cost System

Number of Truck *4-A-T-K-8*

Capacity in lbs *7000*

Chassis No

MONTHLY COST SUMMARY SHEET

U. P. C. BOOK COMPANY, INC. 243 249 WEST 39TH ST. NEW YORK

#### Investment

Cost of chassis, less tires	
Cost of body	
Cost of equipment	
Cost of tires	
Total cost, complete	

\$	4	646	70
		453	30
\$	5	100	00

#### Performance Record

2—Days operated	278
3—Days idle	262
4—Days maintained (Item 2—Item 3)	540
5—Total hours operated	2214
6—Total miles covered	15800
7—Total trips made	1390
8—Total <del>ton</del> or packages or stops	5560

*Cubic yards*

#### Performance Averages

9—Average miles per day maintained (Item 6—Item 4)	29.26
10—Average miles per day operated (Item 6—Item 2)	55
11—Average miles per trip (Item 6—Item 7)	11
12—Average <del>ton</del> or packages per trip (Item 8—Item 7)	4
13—Average <del>commercial ton</del> or package miles or stop miles per trip	22

#### Recapitulation

14—Total expenses for month (Sum of Items A, B and C)	\$ 5494.15
15—Cost per day operated (Item 14—Item 2)	19.76
16—Cost per day maintained (Item 14—Item 4)	10.17
17—Cost per mile operated (Item 14—Item 6)	.3477
18—Total <del>commercial ton</del> or package miles or stop miles (Item 7×Item 13)	30580
19—Cost per <del>commercial ton</del> or package mile or stop mile (Item 14—Item 18)	.1797

Above are given first the detail of the original cost of the chassis, then the performance record on the truck and finally a recapitulation, based on this performance record and on the total costs, carried over from the sheet on the opposite page. The truck operated only 278 out of a total of 540 days, so that the fixed costs were high compared to the truck's earning days. The truck is a large one and the cost per mile operated is not high (\$.3477). The average cost per cubic yard-mile was \$.1797.

# The Better Way

To Save Time in Truck Repair and Maintenance

## No. 662—Ball Bearing to Lower R.P.M. of Shaft

HERE is an idea for reducing the r.p.m. of the line shaft and also for reversing the drive in shop power work. The latter feature is particularly interesting. As shown in the accompanying illustration, the two bearings on the shaft are stationary by reason of their being riveted to the supporting bracket. The latter is bolted to the ceiling. Though there will be a certain amount of slippage between the bearings and the shaft when heavy pulling occurs, this slippage will be practically absent when light power is needed, for instance in driving a grinder, etc. The fact that the bearings are stationary gives the reversing action to the belt which runs on the tube. The latter is supported on the outer races of the ball bearings. It is manifest that the belt will have a reduced r.p.m. when the bearings are used. —ROSSI SEVERINO, Torino, Italy.

## No. 663—Fullers Earth Distributor

FULLERS earth is easily distributed over the surface of a cone clutch by the use of an oil can to which is soldered a short piece of tubing, a rubber bulb being attached to the end of the tube. The Fullers earth is placed in the can.—O. R. MUMMERT, Alliance, Ohio,

## No. 664—Jig for Spark Plug Disassembly

HERE is a useful idea for the repair shop. It is a substitute for the well known method of using two wrenches when disassembling the spark plug. This latter method serves its purpose but it is a much slower operation than that illustrated herewith. This useful little jig can be made either from a standard spark plug wrench or a head wrench. Both are attached to the bench, as illustrated. A  $\frac{3}{4}$ -in. hole is drilled in the lower end of the spark plug. It is best to cut off a part of the wrench handle either before or after fastening it to the bench. This will tend to keep the wrench steady during the disassembling operation. —EDWARD PREDAR, Rock Island Ill.

## No. 665—Lubricating of Universal Joint

HERE is a method for lubricating the universal joints that is stated will prevent the possibility of grease plugs

*TO help motor truck owners and operators to save money in the maintenance and repair of their trucks, THE COMMERCIAL VEHICLE prints on these four pages better methods of maintaining trucks and the latest ideas in making quick repairs.*

THE COMMERCIAL VEHICLE will pay \$1 for each new idea which it accepts on better truck maintenance or good repair jobs you have made, or as much above that amount as the idea is worth. Simply tell us exactly how it is done and send a rough pencil sketch showing clearly the method employed or the device used.

coming off and the consequent burning out of universal joints. Any one of the patent grease plugs may be used in place of the standard grease plug. Before attaching the grease plug, the mechanic should patch over the hole formerly occupied by the grease plug. The patented grease plug should not be attached until a piece of flat iron,  $\frac{1}{4}$  by 1 by  $\frac{5}{8}$  in. in size has been riveted or soldered on to the front end of the universal joint, as shown in the accompanying illustration. This piece of flat iron, cut off of  $\frac{1}{4}$  by 1-in. bar stock, should have an 11/32-in. hole with a  $\frac{1}{8}$ -in. pipe thread to permit the insertion of the grease plug. The reason for putting on the outside cap is to allow it to pass the gearshift mechanism when applied to front end of the shaft.—READER, Pittsburgh, Pa.

## No. 666—Safety Device for Towing Chains

THIS spring absorbs the shock when the chain is suddenly drawn up taut during towing. This spring is of the heavy spiral type and is attached to the tow chain as shown in the accompanying illustration.—R. LEE, Oasis, Utah.

## No. 667—V-Blocks Made from Angle Iron

MANY bench jobs are simplified by using a V-block made of angle irons riveted together. In one position or another, the appliances will hold round or flat stock; and in some operations it can even be substituted as a vise, with the additional advantage that it may be moved from place to place. In making, the mechanic should cut four lengths of 1½-in. angle iron, making each piece 2 in. long. Then use a file to smooth the edges on the surfaces that are to be riveted together. Drill and countersink the rivet holes and file off the heads when they have been jointed together.—FLOYD GIER, North Collins, N. Y.

## No. 668—Tire Mileage on Rim for Checking Purposes

EVERY progressive fleet owner or individual truck owner is keenly interested in keeping track of his tire mileage. Some keep a complete history of each tire from the day it is bought until it is ready for the scrap pile. This is a good method and should be adopted when possible. On the other hand, when the owner has insufficient time to take care of the detail connected with keeping records of this kind, the idea shown in the accompanying illustration will serve to keep a check on tire mileage. When the tire is taken off, the mileage recorded on the speedometer or hubodometer is painted on the rim. This mileage is then compared with that of the next tire taken off, thus giving the owner the opportunity of finding out whether he has received satisfactory service or not.—S. S. BOND, Hattiesburg, Miss.

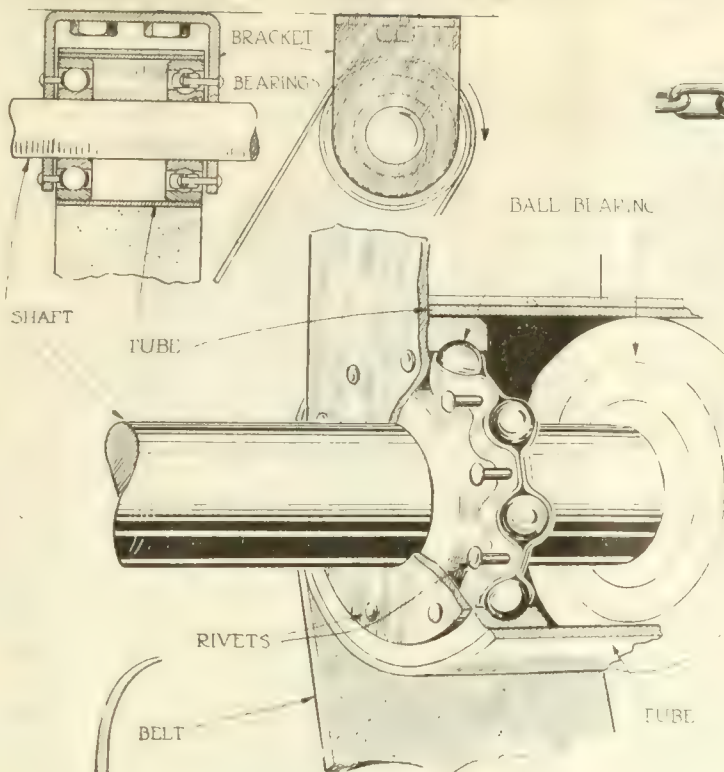
## Ford Starting Made Easy in Cold Weather by Jacking Up Wheel

To the Editor, COMMERCIAL VEHICLE:

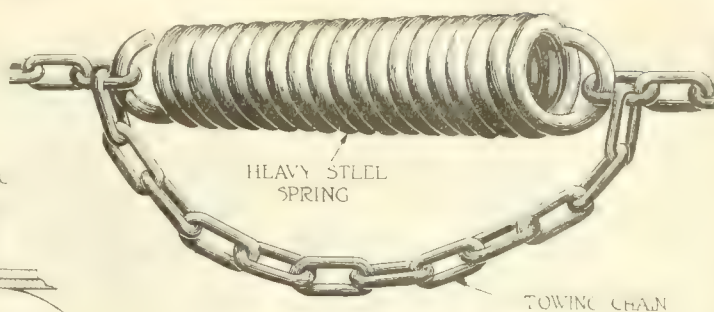
In starting a Ford car in cold weather, either with the hand crank or by use of the starter when the battery is low, jack up one rear wheel and set the brake in neutral. If the engine is getting spark and fuel properly, it will start as easily as in warm weather.

Care should be taken to set the brake again in order to stop the rear wheel spinning, otherwise the car or truck might start forward.—C. R. KENT, Coopersville, Mich.

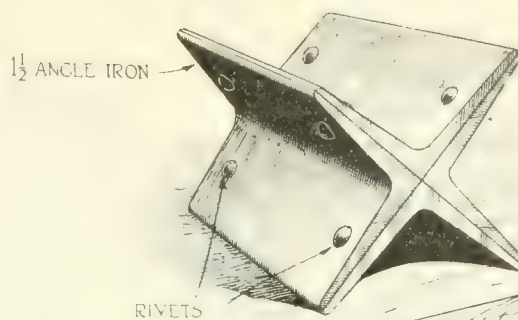




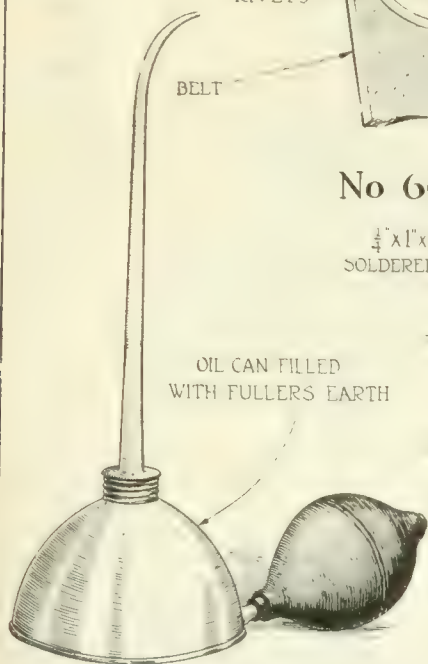
No. 662



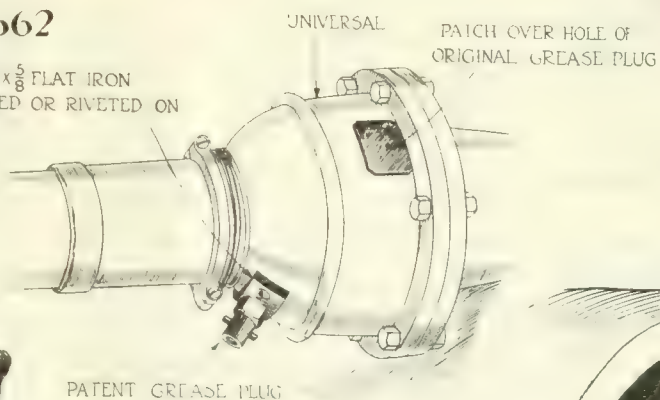
No. 666



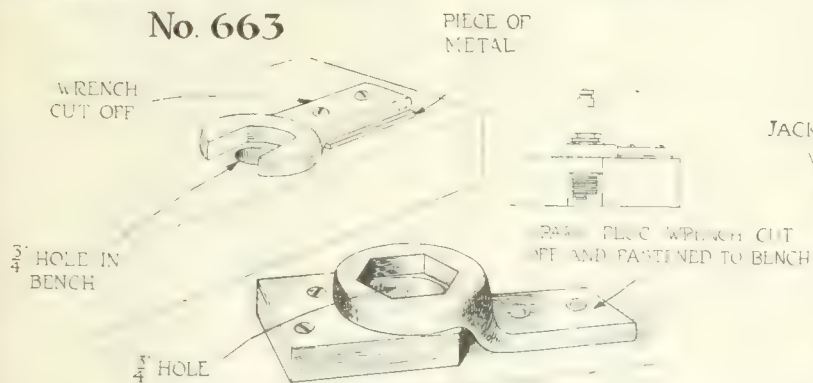
No. 667



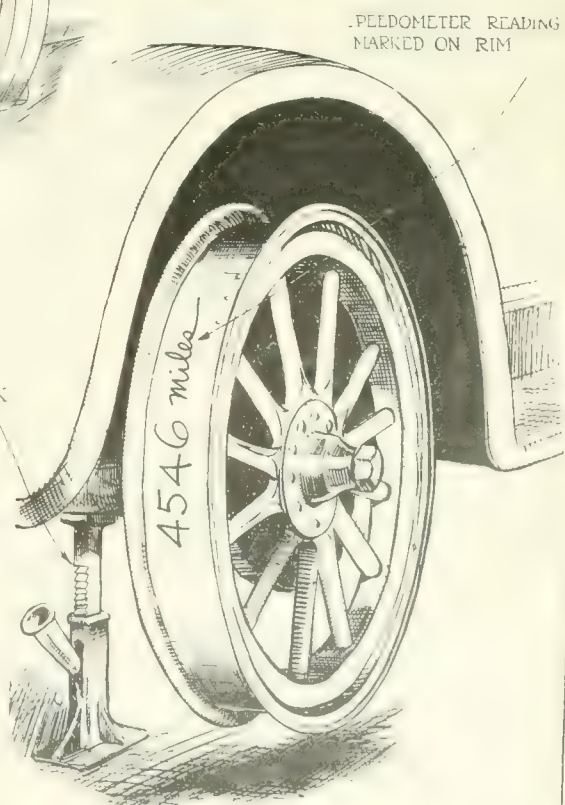
No. 663



No. 665



No. 664



No. 668

## No. 669—Side Windshields on Autocars

THE accompanying sketch shows a windshield for the dash of a 2-ton Autocar. This shield does not interfere with the gearshift and as it is fastened to the dash it does not interfere with the raising or lowering of the seat. The driver's feet are well protected from cross draughts.

The shield is made of No. 22 galvanized iron. It is supported from the dash to the seat at the top by a piece of ¼-in. round stock. A 1 by ¼-in. flat iron brace supports the shield vertically, the galvanized iron being riveted to the brace. At the front the shield is riveted to the dash by five ¼ by 1-in. round head stove bolts.—READER, Pittsburgh, Pa.

## No. 670—Holder for Small Parts

MANY ideas have been worked out for keeping the shop orderly and clean. One of these has been based on keeping all small parts, nuts and bolts, nails, etc., in some convenient place rather than on the floor or spread all over the bench. The holders for small parts shown in the accompanying illustration are made from Ford timer shells from which the fibre and contacts have been removed. The shells are fastened to the top of a board by putting screws or nails through the advance rod holes.—A. CHURCH, Alexandria, Neb.

## No. 671—Releasing Vacuum in Grease Gun

THE vacuum set up after grease has been pushed out of a grease gun is claimed to make most difficult the speedy return of the plunger. To save this time, the cover at the top of the grease gun has been split in halves instead of one piece. After the plunger has been to the bottom of the barrel and a vacuum created, the latter is released by unscrewing the split head and then swinging them open. This is a matter of seconds and as a result is a time saver.—ROSSI SEVERINO, Torino, Italy.

## No. 672—Boring Oversize Hole

TO enlarge the bore of a piston pin bushing when only a solid reamer is available, use a thin piece of shim stock and bend it in a vise to an angle bar shape. By laying it over one of the cutting edges an over-sized hole can be bored.—E. MCARGLE, New York.

## No. 673—Removing Endplay in Ford Crankshaft

ENDPLAY in the Ford crankshaft is removed by filing the holes in the rear bearing cap with a rat-tail file. The cap is then moved back and iron shims put between the side of the hole and the bolt to hold it in position.—D. B. GRAY, Hull, Ill.

## No. 674—Funnel for Vacuum Tank

A SMALL funnel for filling vacuum tanks is made by soldering a piece of copper tubing to an old vacuum tank float, a hole having first been cut in the center and top of the float cut away. This is a good accessory to carry along in a truck that is equipped with vacuum feed. Occasionally the fuel runs dry and when this happens, the vacuum tank must first be filled before flow from the tank to the carburetor will take place. Filling of the vacuum tank is not easy on account of the small opening into which the gasoline must be poured. A small funnel proves more economical and efficient.—O. R. MUMMERT, Alliance, Ohio.

## No. 675—Reducing Main Spring Fracture

SPRINGS must be properly bracketed in order to avoid fractures. Without sufficient bracketing, the main leaf will be subject to abnormal up and down movement and in time will fracture. In other words, each time that a forward stress is brought to bear on the spring, the main leaf will alone be subject to up and down motion, the rest of the leaves remaining flat. On the other hand, when all of the leaves contribute resistance to this forward stress, the up and down motions are therefore held to normal and the main leaf saved from undue fatigue.

The accompanying illustration shows a method of reducing the forward stress on the springs. The springs are bracketed from the center to both shackles, as shown in the sketch. The bolts of the brackets or clips are prevented from creeping by grooving the springs at those places where the brackets are to be put on. Grooving of the springs also permits loose fitting of the clips to allow proper gliding of the leaves.—ROSSI SEVERINO, Torino, Italy.

## No. 676—Making Ford Oil Pipe Accessible

THE causes of burned out Ford bearings are often a mystery. The driver has given particular attention to the replenishing of his oil supply and still experiences the foregoing trouble. Because of the fact that the oil funnel in the transmission is inaccessible, it is not given the proper attention by the average Ford owner. This funnel is under the gear cover and in order to get at it, this cover must be taken off. Oil splashed from the flywheel and gears enters this funnel and is then passed through a tube to the timing gears and from there back through the crankcase to the transmission case. Quite often fluff and shreds from the brake bands on the transmission collect sufficiently to clog the passage of the oil through this funnel and as a result the owner experiences bearing trouble.

The accompanying illustration shows a good way of making this oil funnel

accessible for periodic cleaning purposes. A hole is drilled through the transmission cover immediately over the funnel to permit insertion of a wire. This hole is closed up with a pipe plug, the hole being threaded to take this.—D. B. GRAY, Hull, Ill.

## Allied Motor Commerce Elects Officers

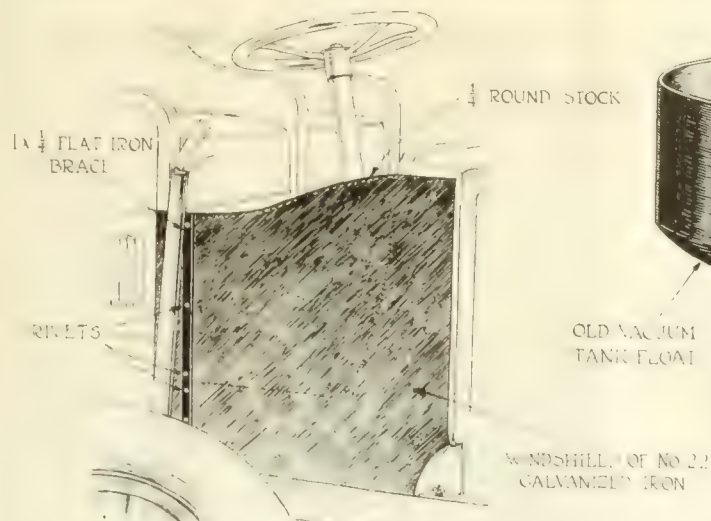
INDIANAPOLIS, Jan. 3.—Allied Motor Commerce of Indiana, which was launched to carry on transportation by trucks for the State in the anxious days when the rail strike threatened, recently consummated its permanent organization through the election of officers for the ensuing year and the adoption of a constitution. The newly elected officers are Joseph G. Hayes, president; Tom Snyder, secretary; Joe Seiter, treasurer; chairman of the board of directors, Frank M. Laird. Other directors are R. C. Yeomen, W. S. Frye, O. C. Haug, Thomas Hatfield and C. C. Pierson, all of Indianapolis. Later additions to the directorate will be made for out-of-state places.

The membership is to be composed of organized associations who are large users of motor trucks; organized industries that employ motor transport; and individual firms and corporations who are in industrial fields employing motor transport but have not yet been organized into associations. In all cases membership application of those not yet identified with the movement must be made through the executive secretary of the association to which the applicant is attached. Associate membership of firms and companies who are fleet owners but not identified with organized industries, is provided for.

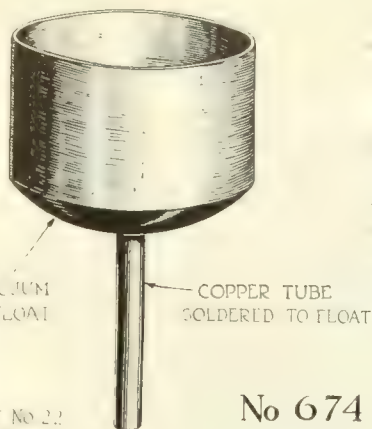
Organized primarily for educational and protective purposes and for legislative and industrial development for the benefit of fleet owners and for the advancement of all the interests of motor transport, considerable attention will be given during the coming year to highway matters and their building and maintenance from a transportation point of view. The body has pledged itself and its members to carry on an active campaign promoting every project that will net more improved and permanent highways for Indiana.

A data, information and collection bureau will be established to gather all possible information having to do with highways, transport and cartage in city streets, regulation of traffic and other transport matters. Such information will be supplied to city, county and state officials for use in framing fair and adequate regulation that will help the development of motor transport to serve the community and the state more adequately. A Motor Transport and Transfer School will also be established in Indianapolis in order to train employees and executives for motor transport work. There is to be a permanent transportation committee and one on legislation to be made up of members from all congressional districts of the state.





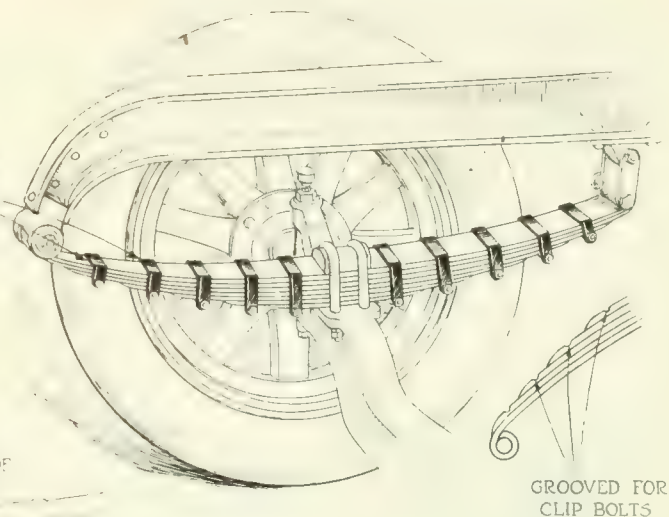
No. 669



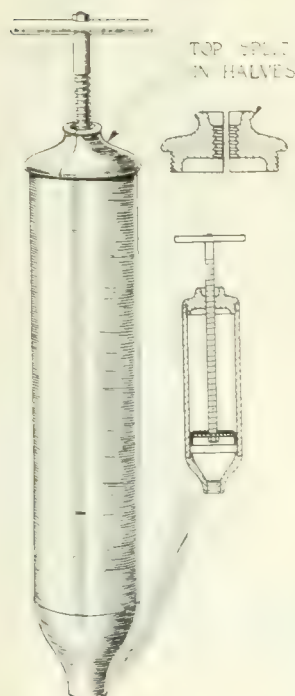
No. 674



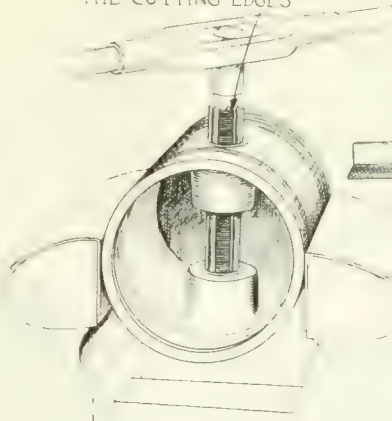
No. 670



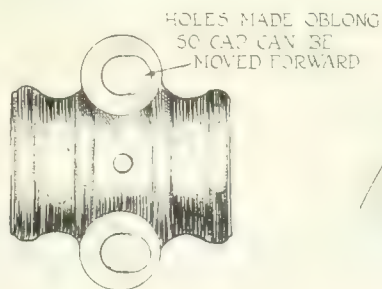
No. 675



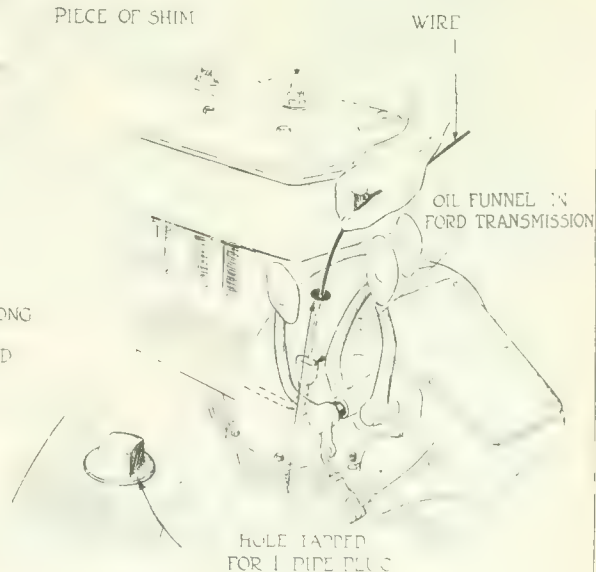
No. 671



No. 672



No. 673



No. 676

## Buyer's Department of The Commercial Vehicle

### White Brings Out Motor Bus of Special Design

A SPECIAL type of motor bus having new features of design which are important in passenger transportation has been brought out by the White Co., Cleveland. The new design is one of the first in which both chassis and body have been developed especially for bus work.

Regular models of motor trucks have been successful in bus service, but the rapid development of passenger transportation by motor bus and the use of the bus in new classes of service have brought out many new operating problems which are met best by special design.

The new White bus chassis is listed at \$4,400, this price including frame braces and standard equipment. Bodies are extra.

The engine used on the Model 45 is used on the new bus. This has a bore of 4¼ in. and a stroke of 5¾ in., giving a horsepower of 28.9.

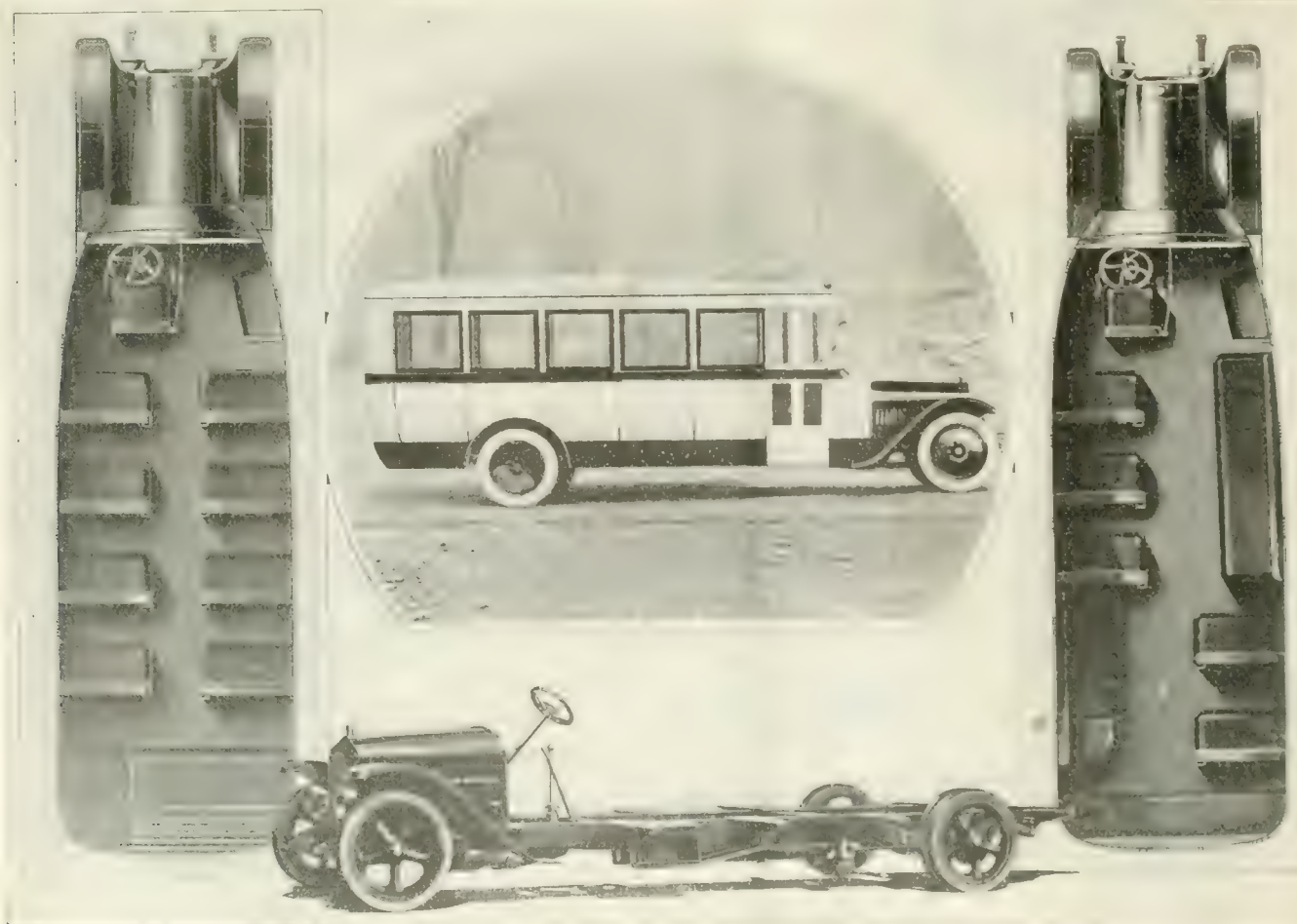
Metal wheels and solid tires are standard. Disk wheels with pneumatics are \$250 extra. The latter equipment includes one extra wheel. Dual rear wheels are used with both solids and pneumatics. The solid tire sizes are as follows: front 36 by 4; rear 36 by 4 for dual and 36 by 7 for single. The pneumatic tire sizes are 36 by 6 all around. Tire changing has been made easier in the case of the pneumatics by the use of the Budd-Michelin wheels, in which two wheels are used. A blowout in this case does not necessitate taking off an entire single wheel to get at the inside or outside tire. It is stated that a switch from solids to pneumatics does not materially alter the ground clearance.

A four-speed gearset is used. Other features include a 198-in. wheelbase, making it possible to mount, without excessive overhang, a body which has comfortable seats for twenty-five pas-

sengers. Long and flexible springs, a low center of gravity and the long wheelbase, combine to make riding easy. Because of its low loading height, only one step is needed at the entrance. Passengers can enter or leave rapidly so that stops are short and fast schedules can be maintained.

Two types of bus bodies have been designed for the bus chassis—one known as a city type and the other an interurban type. Operating companies, however, may use other types of bodies when desired. The city type permits of great freedom of movement about the interior and eliminates "choking" at the entrance. The interurban type is designed for the utmost comfort of passengers on long trips, with ample space for luggage. Both types have wide double doors at the front and an emergency door in the rear. Modern heating and ventilating systems are installed.

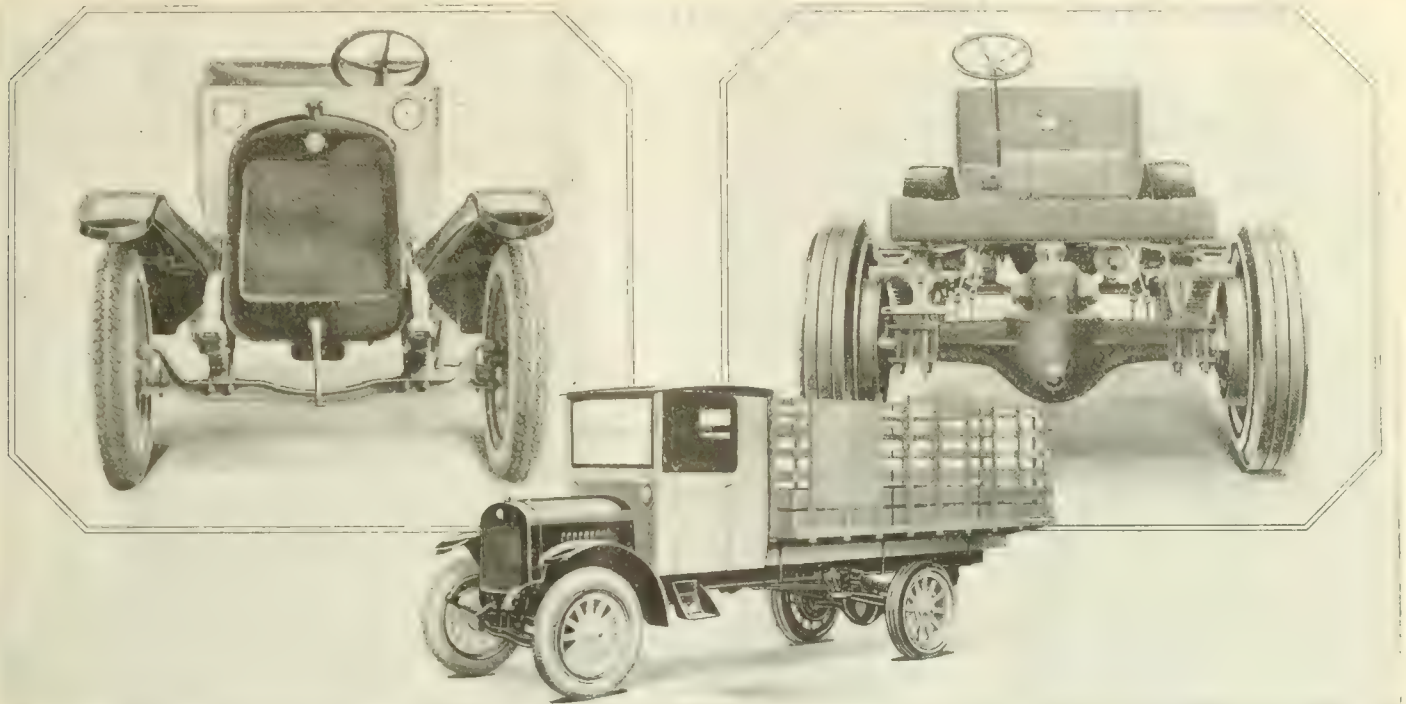
Standard equipment includes generator and electric lights, and side braces on the frame. The use of various optional standard gear ratios makes possible a wide range of speed and acceleration for different traffic conditions.



The White bus has a 198-in. wheelbase, long and flexible springs and a low center of gravity



## Buyer's Department of The Commercial Vehicle



The new 2-ton Ruggles resembles somewhat the exterior of the 1-tonner. The new model, however, differs in the selection of some of the major units. A double reduction axle and a new engine are used. All of the units are of well known makes

## Ruggles Adds a 2-Ton Model to Its Line

Double-Reduction Axle and New L-Head Engine Included in Assembly of Truck

THE Ruggles Motor Truck Co., Saginaw, Mich., has added a 2-ton model to its line which up to this time has included a 1-ton size.

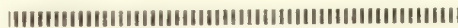
This new model weighs 3950 lbs. and is powered with a 38 hp. four-cylinder L-head engine, cast in block with a detachable cylinder head. The bore is 4 in. and the stroke 5 in., maximum horsepower being developed at 1600 r.p.m.

The connecting rods are vanadium alloy steel I-beam sections drop-forged and heat-treated. All the wearing parts are provided with bronze bushings. Present day gasoline conditions are met by a hot-spot manifold that insures thorough carburetion. Full particulars covering the design of this engine were brought out in the Jan. 1, 1922, issue of THE COMMERCIAL VEHICLE, page 26.

The rear axle is designed to meet the pulling strain of overloads. It is a double-reduction axle with final reduction in the differential. The Ruggles axle is equipped with an air-tight housing that protects all working parts from dirt, water and harmful substances. Differential gears and bearings are full size and mounted in a single assembly.

Standard units have been adopted for the other parts of the truck. It has a

Stromberg carburetor; Alemite high-pressure grease lubrication system; Brown-Lipe multiple dry-disk clutch; tubular propeller driveshaft with three



### Have You Studied the Pacific Coast?

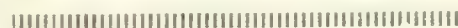
BUS owners in the East should study the progress in passenger transportation made during the past few years out in the West.

The Pacific Coast has taken leadership in modernizing motor bus transportation. Operators out there long ago realized that road transportation should be placed on a plane as high as that of the railroad.

And their efforts along these lines have borne fruit.

Read what Seattle, for instance, has accomplished. Bus transportation in the East must be developed with the same farsightedness.

### Profit by This Example!



enclosed Spicer universal joints; Bosch high-tension magneto ignition; Jacox worm and split-nut type irreversible steering gear, and Brown-Lipe sliding se-

lective type transmission, four speeds forward.

Standard tire equipment is 34 by 5 non-skid cord tires in front, optional with 34 by 4-in. solids; rear 34 by 7 in. solids. Where all-pneumatic equipment is desired the recommended sizes are front 36 by 6, rear 40 by 8.

The standard wheelbase is 148 in. and the long wheelbase, delivered as a special order, is 165 in. The chassis length overall is 220 in.; from dash to rear of frame, 170 in.; width of frame 34 in.; width overall is 68 in. The distance from the back of the seat to the rear end of the frame is 134 in. The tread is 58½ in.

Standard equipment includes oil lights front and rear, tools and kit including jack, wheel puller and hand tire pump, seat and cushions and hand horn.

The Ruggles company is prepared to furnish with the 2-ton model a choice of bodies. Each truck is equipped with the Ruggles all-weather cab. There is plenty of leg room for the driver. The left hand door is fitted with a handy pocket for carrying bills or receipt book. Heavy plaited black upholstered cushions built over braced spiral springs, make a comfortable driving seat.



# Buyer's Department of The Commercial Vehicle

## New York Show Accessories

### *New Products and Refinements Hold Much of Interest for Truck and Bus Owners*

**T**HIS year's accessory exhibits at the New York show held much of interest to truck and motor bus owners in the way of new products and refinements in design.

Among the new products that were shown by the Stewart-Warner Corp. is a new pentagon hinged radiator cap which is designed to carry both the Moto-Meter and the Warn-O-Meter. This cap sells for \$6. A new combination parking searchlight and headlight for mounting on the fender has also been brought out. This sells for \$12. New mirrors have been added to the Stewart-Warner line. A stop signal which lights automatically when the foot brake is depressed was exhibited. A feature of this product is the addition of a small dash light which signals whether the stop light is working or not. The price of the outfit complete is \$5. A new Ford exhaust-heated carbureter that is guaranteed to give from 20 to 30 m.p.g. has been brought out. The outfit complete with integral exhaust and intake manifolds sells for \$20. The new Stewart air washer for passenger cars, motor trucks and tractors was of particular interest. This has been designed to practically complete removal of dust from the air entering the carbureter, causing the air to pass through and become thoroughly mixed with a fine water spray. During this mixing the water gets possession of the dust and retains it.

### New Dual Disk Wheel

The Budd Wheel Corp. exhibited a new dual disk wheel for trucks which is stated to weigh only 100 lb. Each wheel is equipped with a single disk and carries 34 x 5-in. tires, replacing a 200-lb. 40 x 8 wheel.

The Sparks-Withington Co. has brought out an adjustable horn bracket for engine mounting purposes.

The Wheeler-Schebler Co. is exhibiting the new Model S air-valve carbureter, which is somewhat similar in design to the old air-valve carbureter brought out prior to the plain-tube type which is on the market at the present time.

The Splitdorf Electrical Co. has brought out the new Model S magneto, designed for many purposes in connection with which the ability to give firing sparks at extremely low speeds of rotation is essential. Although the design of the new line is based on that of the Aero type, it embodies a considerable number of important changes; some of these

were made with a view to increasing the efficiency of the machine; that is, its output under given conditions of speed, width of gap and compression, while others were made with the object of making it a better manufacturing proposition. Among the models shown in this new series is that for dual-spark ignition.

### Speed Truck Axles

The Timken-Detroit Axle Co. exhibited a new bevel-driven  $\frac{3}{4}$ -ton speed truck type of axle, No. 5311. Both this and the No. 5511 bevel-driven 1-ton size are equipped with fixed hubs and duplex brakes. The company has also brought a worm-driven axle for speed trucks of  $\frac{3}{4}$  to 1-ton capacity. This model, No. 6250, is also of the fixed hub type.

The Utica Compressor Co. has brought out two new models, one designed for intermittent truck tire service and the other for continuous tire and shop repair service. The former has an air-cooled twin-cylinder compressor with an entirely new valve construction and is driven by a  $1\frac{1}{2}$ -hp. motor and provided with an automatic controller and pressure release permitting the motor to start without a load. This model has a pressure of 200 lb. and a tank capacity of 60 gal. The price is \$590. The other model is equipped with a twin-cylinder water-cooled compressor and is driven by a 2-hp. motor. This model has a capacity of 11 cu. ft. of air per minute and is especially adapted for taking care of giant pneumatic tire inflation, as well as for general repair work where air is used for cleaning engines, etc. The price is \$653.

The Double Seal Ring Co. exhibited a fuel vaporizer called the Kerofier. This device separates the liquid fuel from the air after it has passed through the carbureter and deposits it against an unheated wall or inner bowl, allowing the air with the lighter vaporized parts of the fuel to pass on to the combustion chamber. After the liquid part of the fuel, which was suspended in the air, has been separated from the air and thrown against the unheated wall of the inner bowl of the Kerofier, it drains down over the heated portion of the wall where it is vaporized, is mixed with air and passes into the combustion chamber. The price is \$25 complete and ready to install.

Byrne, Kingston & Co. has placed on the market a new vacuum fuel system. This is a one-valve structure mechani-

cally operated and hydraulically controlled. The hydraulic control of this single valve eliminates the use of all springs, toggles and other mechanical means. The operating chamber has no direct connection to atmosphere and therefore is claimed not to draw dust and dirt particles from under the hood of the car. There is an outer chamber inclosing an inner chamber. The operating mechanism is contained in the inner chamber or slip tank. The suction of the engine draws the fuel into the slip tank, and as the level gets higher, the float rises and opens the valve which allows the fuel to enter the outer chamber. This operation is repeated until the level in the outer chamber reaches the valve level. The company has also brought out a new carbureter for Fords, priced at \$6.

Four new axles were shown by the Clark Equipment Co. Two of these are of the bevel gear type and two of the internal-gear design. The bevel gear types are designated as Models B and C. The former is for trucks of from 1 to  $1\frac{1}{2}$ -ton capacity and the latter for trucks rated at  $\frac{3}{4}$  to 1 ton. Both are designed for use with pneumatics. The road building axle is of the internal gear type and is intended for use on trucks rated at  $2\frac{1}{2}$  tons. A specially designed bus axle with a 71-in. tread has also been brought out. Another feature is the  $3\frac{1}{2}$ -ton over-head internal-gear axle.

### Oil Reclaimer

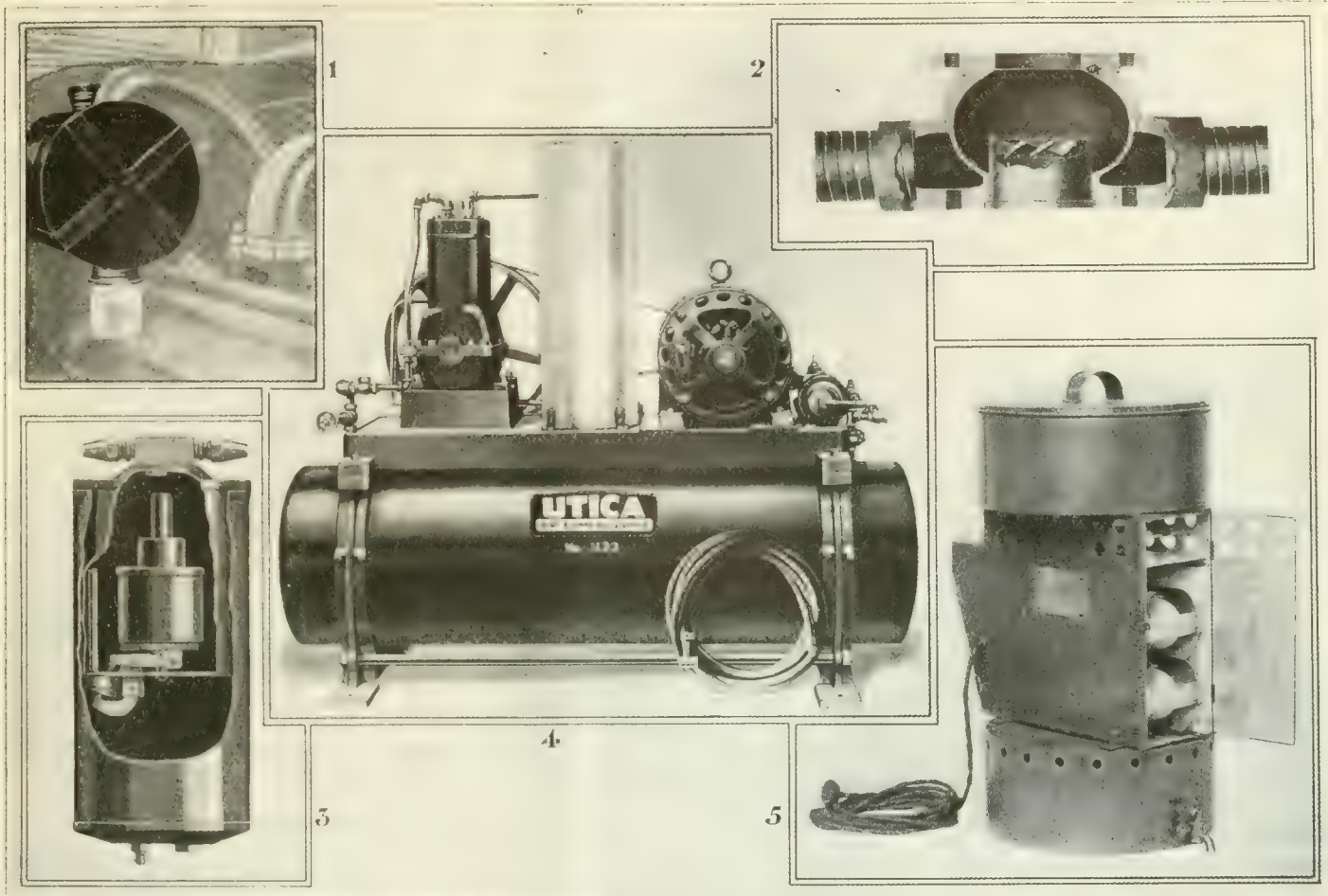
An oil reclamation outfit, designed to remove impurities from crankcase oil, was exhibited by the General Electric Co. This reclaimer consists of two parts, a tank where the solid matter is precipitated from the oil and the heater where the volatile impurities are driven off. The heat is supplied by electric lamps. The purified oil is collected in a container at the bottom of the reclaimer.

The Storm-King electric windshield cleaner, on exhibition, has an arm that moves back and forth across the entire width of the windshield. The arm is actuated by a chain which is in turn operated by an electric motor installed at one side of the windshield. It is manufactured by the Doughty Mfg. Co., New York City.

The Westinghouse Lamp Co. exhibited its new Spark-C ignition tester. The essential part of this device is a small Geissler tube filled with neon. This gas, when in a pure state, will pass an electric discharge, and will at the same time give a striking appearance in a form of a fiery red light. The tube is about 2 in. long and about  $\frac{1}{4}$  in. outside diameter. The central portion of the tube is constructed to increase the brilliancy of the discharge.



## Buyer's Department of The Commercial Vehicle



Views of the new accessories at the New York Show. 1—The new Stewart-Warner air washer for trucks. 2—The Double Seal Kerofier. 3—The Byrne, Kingston & Co. vacuum fuel system. 4—The Utica air compressor, which is water cooled and designed for continuous shop service. 5—General Electric oil reclaimer

## Does Highway Transport Aid Railroads?

(Continued from page 15)

and commercial prestige of our country. It was with the same foresight that the people, through the Government at Washington upon learning of the future inauguration of ocean liners of the type of the Olympic, the Titanic, and the Majestic, saw to it that Ambrose Channel was deepened in order that these giant vessels might ply between New York and the continent of Europe. The channel was deepened, not only for these liners but for the good of the nation's commerce in general. In just the same way good roads are built on land.

For after all, in the last analysis, as A. Barton Hepburn of the Chase National Bank some time ago pointed out, the automobile industry produces "not more cars and motor trucks, but transportation; exactly, as coal and steel and grain and cloth are basic necessities." Think this premise over and you will see the larger vision that our Congress-

men at Washington had when they appropriated \$75,000,000, for allocation among the several states of this country for road construction.

By the very nature of things, I am glad to say, therefore, the motor truck has become an ally rather than a competitor of the railroad, making possible the permanent and intensive development of the long haul which is the logical and profitable field of railroad operation. Gerrit Fort, vice-president, Boston and Maine Railroad, to whom I referred a few moments ago, substantiates this in characteristic language by declaring that "the motor truck has come to stay. It represents an economic change in transportation conditions which is little short of revolutionary. There is no use in fighting the motor truck. Within their own field the trucks are unbeatable."

Before closing I want to bring you

a message of cheer. In my opinion better general business conditions and more satisfactory results as a whole can be reasonably expected for this year than last. Bankers are entering the New Year with considerably greater ease of mind than they felt at the opening of 1920, when they foresaw that an adjustment must come about. Now it appears that within a very short time the after-war leveling process will be completed.

In my judgment there is no cause to fear a general collapse of commodity prices. However, due to the several readjustments that will have to be made in some lines of business no great or spontaneous revival of business can be looked for immediately.

President Harding has given us all the proper perspective in that well-known paragraph, in which he declared that "the people of Washington and Lincoln are conquering the difficult problems of to-day no less worthily and with the faith and confidence which they bequeathed to us. We are sure to find the way to restored prosperity and our meed of happiness."



# Buyer's Department of The Commercial Vehicle

## R & C Cylinder and External Laps

A LINE of standardized laps with interchangeable and replaceable shells has been recently developed. The laps are made for both external and internal use, in sizes from ¼-in. up. The replaceable shells are supplied in two grades, the use of which depends on the speed of cutting desired and the type of work. The lap consists of a shank of floating type, and an expanding device for adjusting the size, as well as taking up the wear of the soft metal shell which is charged with the abrasive. During the expansion of this lap, the diameter is kept constant throughout the length, assuring a true bore, free from bell-mouthing or tapering.

The external lap has been designed to give accuracy in work on the crankpin and main bearing surfaces of the crankshaft and is intended to eliminate scraping and reaming of connecting rods. The maker is the R & C Lap Co., Davenport, Iowa.

## Celco Ignition Meter

THIS is designed for the purpose of detecting ignition trouble of any nature. It is a simple "terminal to ground" test that is made under actual working conditions, using space in the open air to offset compression resistance in the engine. The price is \$1.50. The maker is the Cook Engineering Laboratories Co., Los Angeles, Cal.

## Saveall Safety Chuck

THIS chuck has a safety device which prevents drills, taps, reamers, counterbores, etc., from breaking and burning. This safety device is nothing more or less than a soft steel pin, which drives the collet and shears off, when the cutting tool is overloaded. The pin is held in place by a pointed screw which fits in a groove in the pin. When it shears off, it can be removed by loosening the screw and inserting a new pin. Certain sizes of shearing pins are applicable to drills of varying diameters; for instance, the same pin is used with 37/64 and 29/32 in. diameter drills. The maker is the Wade-American Tool Co., 49 River St., Waltham, Mass.

## Bridgeport Cylinder Refinishing Machine

THIS machine comprises a substantial little slidable head, which is provided with an accurately guided, rotating cutter bar, arranged for various sizes of herringbone reamers. The bar is driven at a slow speed and fed by a small electric motor which can be driven

## Shop Equipment for Fleet Owners

from any lighting circuit. The head is supported and guided upon a substantial base which is fastened to the cylinder block by adjustable brackets, means being provided for quick alignment of this base with the center line of the cylinders, and further for finally centering the bar with each cylinder in turn. The cutter bar can be quickly disengaged from its driving mechanism, and raised and lowered to and from the work by a small crank handle. A complete outfit is furnished with the machine, comprising a stand, with various sizes of bolts, clamps, stops and adjustable studs to meet practically all requirements. The maker is the Bridgeport Cutter Works, 50 Reamer St., Bridgeport, Conn.

## Master Battery Charger

THIS charger is claimed to be different in construction from others. A hard-rubber panel switchboard is used. It is reinforced and includes a positive insulator. The knob switch, located in the upper left hand corner of the instrument, is the main shut-off switch and controls the incoming current. The double knife switch located in the lower righthand corner operates and controls the capacity desired or the quantity charging. The control lever, centrally located, is operated in divisions of 1/2 amp., when the knife switch is in contact. If the knife switch is left open each notch in the control box advances 1/2 amp., making it 1 amp. per hour. The maker is the Leader Battery Equipment Co., St. Louis.

## King Socket Wrenches

THIS set includes a T-handle, 90 deg. anglebar, 12-in. extension bar, compact universal joint and twelve tapered, hardened steel sockets, including two in the handle. The sockets have standard openings covering ¼ to ⅝-in. cap screws and ¼ to ½-in. U. S. standard nuts. The price per set is \$7 and in Denver and west is \$7.50. The maker is the King Pressed Steel & Mfg. Co., Boston.

## Peerless Garage Jack

THE lifting capacity of this jack is 3 tons. Model 60 is 11 in. high and has a lift of 4 in., and model 61 is 14 in. high and has a lift of 7½ in. The handle is 29 in. long. The operation of

this jack is entirely controlled by the handle. The manufacturer is the Oliver-Barth Jack Co., Milwaukee, Wis.

## Portable Electric Drill and Stand

THIS portable drill has a capacity of ½ in. in steel. The motor is series wound universal, weighing 12 lb. The load speed is 400 r.p.m. The stand has lever feed, spring return and slotted face plate. The price of drill alone is \$55, with stand \$75. The stand alone is \$20. The manufacturer is the Electro Magnetic Tool Co., 2902 Carroll Avenue, Chicago.

## Grease Dispenser

THE outstanding feature of this device is that it weighs automatically 1 lb. of grease as issued. The dispenser will handle any heavy oil or grease, and an electric-timing device assures correct weight. The motor is of ¼ hp. and is operated by a push switch. The capacity of the container is about 114 lb. When the grease must be fed slowly, a hand crank is used to operate the machine. The machine may also be used to measure oil by the pint or quart. The price is \$195 and the maker is the Baldner-Moore Grease Dispenser, Xenia, Ohio.

## Hart-Bell Truck Jack

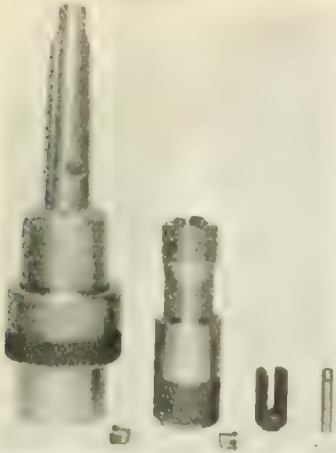
THE No. 5 jack has been designed for trucks up to 5-ton capacity. Collapsed, the overall height is 9½ in., but it has a lifting capacity of 19½ in. by its own mechanism. The handle is 19 in. long. The jack has an iron housing, an inner screw and an outer screw. The outer screw is held in place by friction provided by ball arrangement until the inner screw is entirely raised. It is then released automatically. The weight is 12 lb. The price is \$13. The manufacturer is the Hart-Bell Mfg. Co., Poughkeepsie, N. Y.

## Mammoth De Luxe Air Compressor

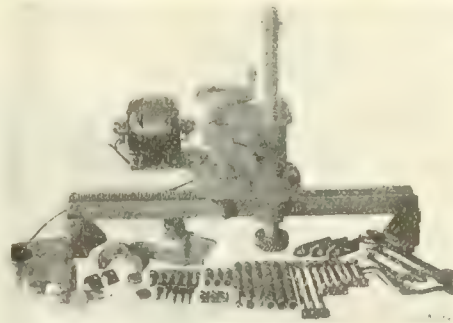
THESE compressors are suitable for large garages. They are heavy duty, water-cooled outfits, capable of delivering large volumes of air. The capacity ranges from 18 to 50 cu. ft. per min., and they are made in both single and double stage types. An overload relay provides protection against overloads of all kinds. A special controller is installed which can be set to stop the compressor at any desired pressure. No special foundations are required, as the outfits are mounted on a heavy iron base. The maker is the United States Air Compressor Co., 5300 Harvard Avenue, Cleveland.



# Buyer's Department of The Commercial Vehicle



Saveall safety quick change chuck



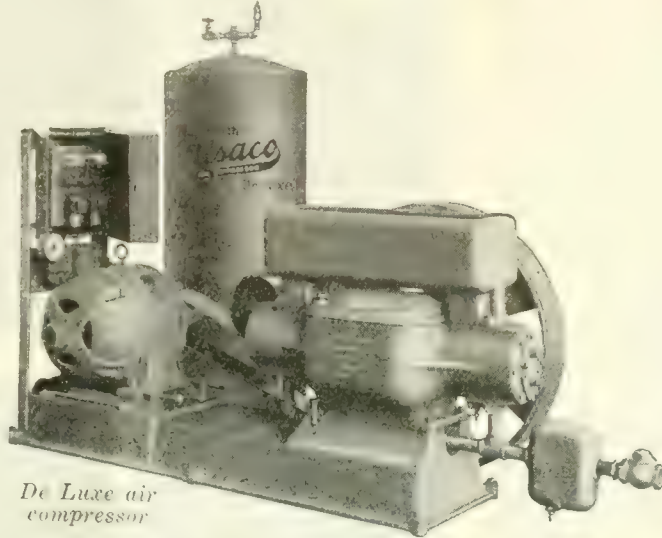
Bridgeport cylinder refinishing machine



Portable electric drill and stand



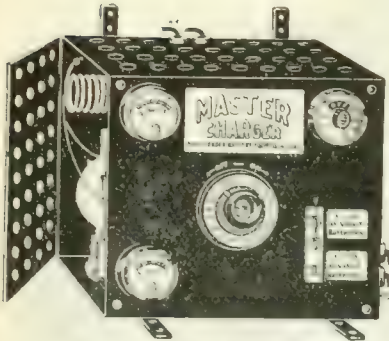
Celco ignition meter



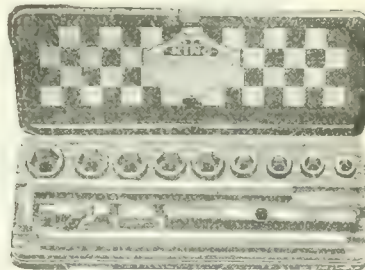
De Luxe air compressor



Grease dispenser



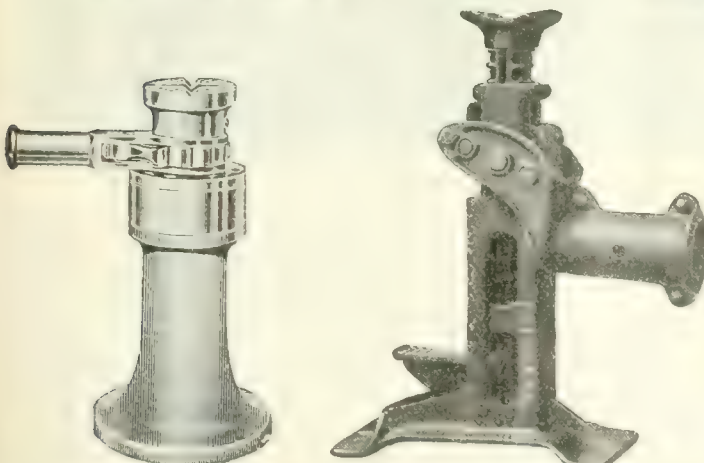
Master battery charger



King socket wrenches



R & C cylinder lap



Hart-Bell jack

Peerless jack



R & C external lap



## Buyer's Department of The Commercial Vehicle

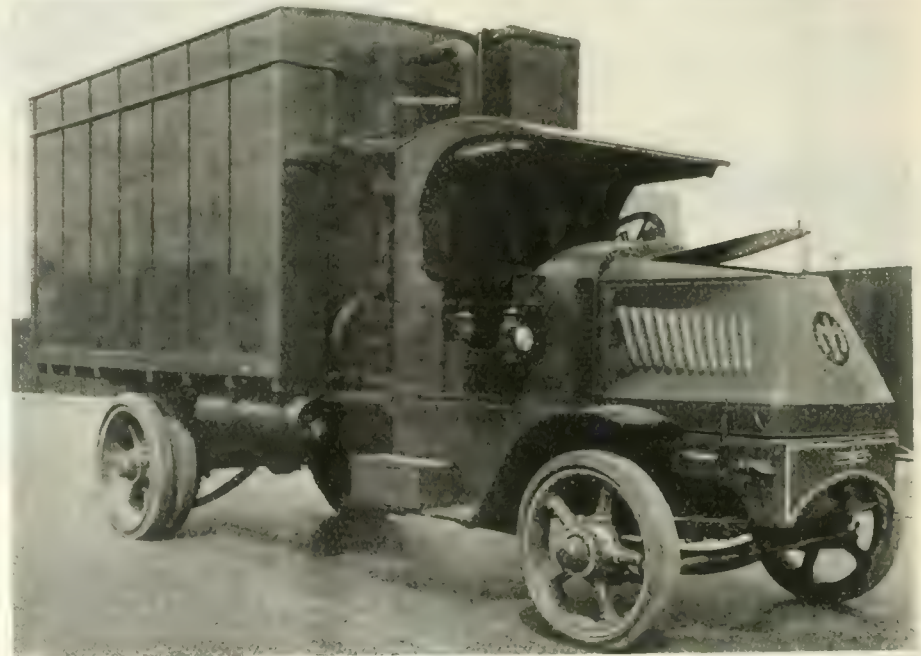
### No Ice Problem with This Body

#### Refrigerating Plant on Truck a Recent Development for Transportation of Per- ishable Commodities

WITH the object in mind of making possible the transportation of such perishable commodities as dressed meat, fruit, vegetables, dairy products, ice cream, etc., without the necessity of hauling an excess weight in ice, R. D. Hatch of San Francisco, has devised a portable refrigerating plant. There is believed to be a growing demand for this sort of equipment, which consists of a cold storage plant using anhydrous ammonia as the cooling agent, mounted on a motor truck chassis. The first outfit to be put on the market is mounted on a Mack truck. It is now being demonstrated in Southern California.

The cooling effect is produced by the evaporation of the anhydrous ammonia through coils of pipe that line the body of the container, which is insulated with ground cork and paper. The refrigeration process takes place during the transformation of the ammonia from a liquid to a gas which is accomplished by passing the liquid compressed to 135 or 170 lbs. through a special valve to the pipes in the cold storage room. Generally liquid ammonia is expanded to a pressure of 15 to 30 lbs. The evaporated ammonia returns to the compressor where it is recompressed and forced through an oil interceptor in through a condenser where the heat is absorbed by water. The water in turn, like the ammonia, is used over and over again, being forced to the top of the cooling tower on the equipment from where it drops over wooden slats to the bottom of the tank. The cooling process is perfected by drawing in fresh air by means of a fan and forcing the air through the broken globules of water. The fan is driven from the propeller shaft of the truck. The ammonia compressor is a class "A" one-ton capacity machine built by the T. P. Jarvis Refrigerating Co., San Francisco.

Probably the most unique feature of the Hatch plant beside its compactness is in deriving the power and running the machinery direct from the drive-shaft of the truck. This device is covered by a patent issued to Mr. Hatch. The body or cooling room is built according to the design of James Ludlow of San Francisco, a refrigeration engineer. It is built on a steel frame with the most approved insulation. Only a short time is required to chill the room even in extremely warm weather. When the re-



*Views of body and method of mounting refrigerating equipment*

quired degree of cold is produced in the body the refrigerating machinery is cut out. Should the temperature in the cooling room rise the machinery again is thrown into gear by means of a hand lever. Another point indicative of the merit of the equipment is the small amount of power required to operate the refrigerating machinery; 1½-hp. being the maximum.

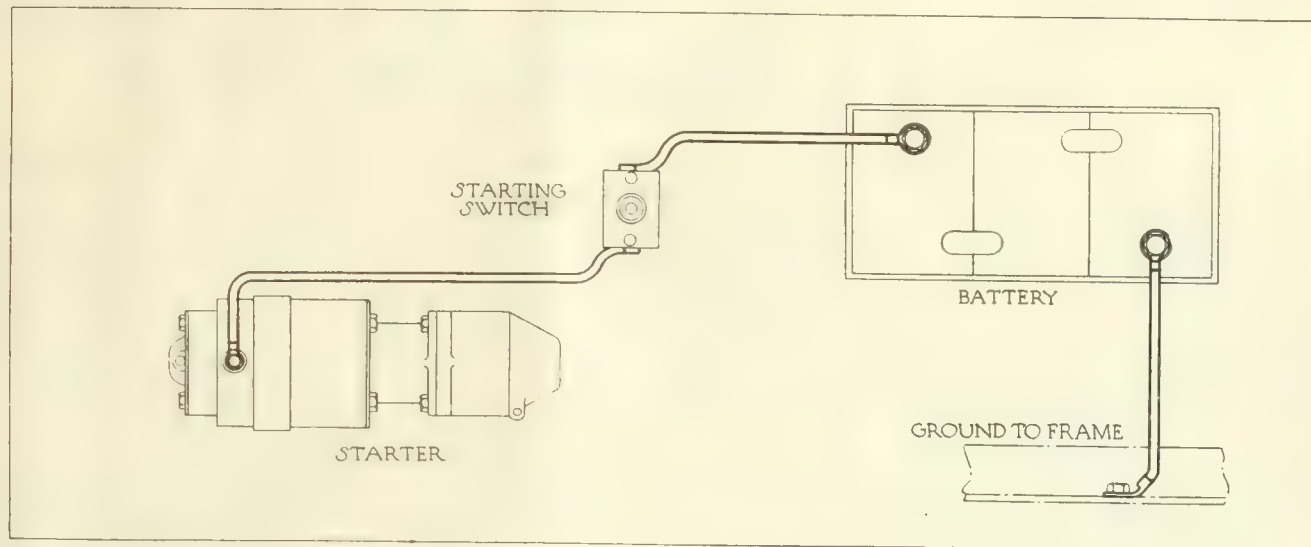
Mr. Hatch speaks of the outfit as a

flexible unit. This is because a load of butter or other perishable commodity may be carried one way and miscellaneous load not requiring cold storage be taken back. Patents are also pending which cover a system of converting the body from a refrigerator to a heater. This will be particularly adaptable for winter use in many parts of the country. By this system hot water would be circulated and the contents kept warm.



# Motor Truck Electric System Wiring Diagrams

## Starting Unit on Service Truck



Starting system used on the Service truck

### These Diagrams Are Valuable —Save Them

When things go wrong with the starting and lighting systems, the first step taken is to seek loose connections. This work is expedited materially by the use of wiring diagrams.

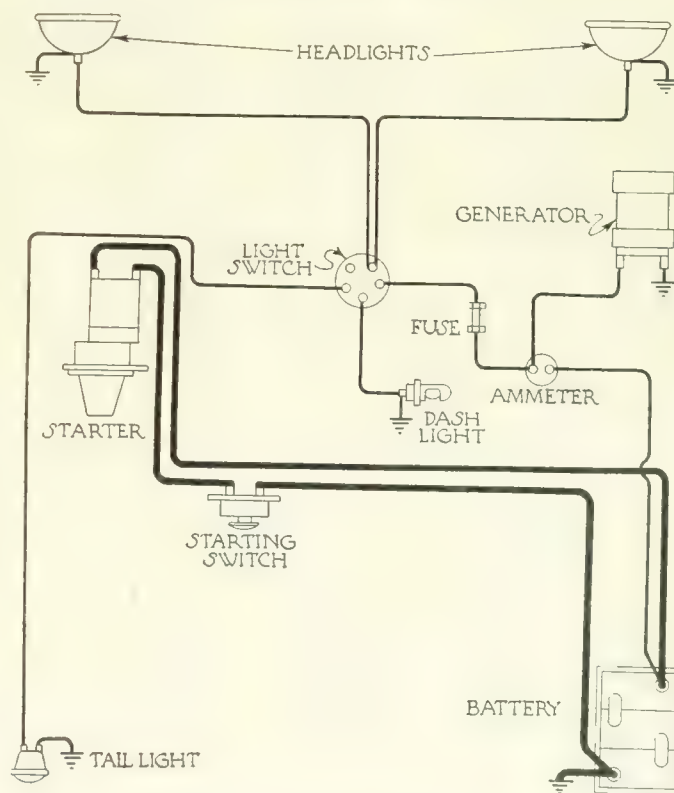
1921

Maxwell, Lighting .....	Jan. 15
International, Starting and Lighting.....	Feb. 1
Mack, Starting and Lighting.....	Feb. 15
Vim, Starting and Lighting.....	Mar. 1
Oldsmobile, Starting and Lighting.....	Mar. 15
Reo, Starting and Lighting.....	Apr. 1
Sterling, Starting and Lighting.....	Apr. 15
Stewart, Starting and Lighting.....	May 1
Kelly-Springfield, Starting and Lighting.....	May 15
Riker, Starting and Lighting.....	May 15
U. S., Starting and Lighting.....	June 1
Wilcox, Lighting.....	June 1
Pierce-Arrow, Starting and Lighting.....	June 15
Republic, Starting and Lighting.....	June 15
Parker, Starting and Lighting.....	July 1
Noble, Starting and Lighting.....	July 1
Onelda, Starting and Lighting.....	July 15
Oshkosh, Starting and Lighting.....	July 15
Knox, Starting and Lighting.....	Aug. 1
Master, Lighting.....	Aug. 1
Watson, Starting and Lighting.....	Aug. 15
Service, Lighting.....	Aug. 15
Packard, Starting and Lighting.....	Sept. 1
Tiffin, Starting and Lighting.....	Sept. 1
Napoleon, Starting and Lighting.....	Sept. 15
Dorris, Starting and Lighting.....	Sept. 15
Moreland, Lighting.....	Oct. 1
Northway, Starting and Lighting.....	Oct. 1
Rock Falls, Starting and Lighting.....	Oct. 15
Locomobile, Starting and Lighting.....	Oct. 15
Seneca, Starting and Lighting.....	Nov. 1
Brockway, Starting and Lighting.....	Nov. 1
Schwartz, Starting and Lighting.....	Nov. 15
Garford, Starting and Lighting.....	Nov. 15
Four Wheel Drive, Starting and Lighting.....	Dec. 1
Jackson, Starting and Lighting.....	Dec. 1
G. M. C., Starting and Lighting.....	Dec. 15
Apex, Starting and Lighting.....	Dec. 15

1922

Service, Starting.....	Jan. 15
Nash Quad, Starting and Lighting.....	Jan. 15

## Starting and Lighting Unit on Nash Quad Truck



Starting and lighting wiring layout as used on Nash Quad truck



### Triple and Single Heat Spring Tempering

To the Editor, COMMERCIAL VEHICLE:

I am interested in knowing how to retemper springs. Any information you may give me will be appreciated.—T. WEBSTER, Trenton, N. J.

This is a very expert job. The following explanation shows the way one of the big spring manufacturers does the job. The carbon content of the steel is the principal factor determining the temper. In pure carbon steel there is a certain percentage of carbon which gives excellent results when properly treated. The concern in question claims to get the finest possible grain with a carbon content of 0.9 per cent by heating to 690 deg. Cent. and cooling quickly. If more or less carbon is used, the grain will not be so fine, because the metal has to be heated above 690 deg. Cent. Three heats are used.

Assuming that the steel is pure and has a carbon content of 0.9 per cent and is 99.01 per cent iron, it is first heated to 760 deg. Cent. It is then quickly quenched to a black heat. If the quenching were carried to ordinary room temperature, the steel would be too brittle to handle. By the above treatment the original structure of the steel is entirely changed and it becomes soft enough to work. It is at this stage that re-arching or setting is done.

After the steel has been given its proper form it is again heated up to 690 deg. Cent., which eliminates the hard spots caused by unequal cooling while it was being worked. After this heat it is cooled less rapidly than in the first case in order that it shall change to the form where it is resilient and tough; but even so, it is still too hard and brittle for use in a properly made spring.

Finally, it is again heated to about 300 deg. Cent. and left to cool gradually. The result is to relieve the cooling strain and allow the steel to assume its final form where it is sufficiently tough, resilient and hard without being brittle.

Another method is by the single heat treatment. In this one the heat is carried up to 690 deg. Cent., quenched for a very short time and allowed to cool slowly. Of course, many hard spots will be present in the finished part, but the one heat method is a quick way which seems to give fairly satisfactory results.

At this point, it should be brought out that there are no hard and fast rules for retempering springs, for the reason that the material used varies enormously. The treatment given above is for a steel

*DEVOTED to topics pertinent to commercial vehicle operation, design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.*

with a carbon content of 0.9 per cent. Other compositions of metal require other treatment. Any good blacksmith will tell you that retempering of springs is an art which can be acquired only through long practice.

### Railroads Supplemented or Replaced by Motor Trucks

To the Editor, COMMERCIAL VEHICLE:

I recently read that a certain railroad in California had entered the motor bus field in an attempt to replenish its treasury and to make up for some of the losses suffered through bus competition. Do you know of any other railroads that have adopted motor trucks for freight or passenger service?—W. SWINGLE, New York City.

You probably have in mind the Pajaro Valley Railroad Co., which operates between Spreckels and Salinas. It is now operating passenger, express and freight motor trucks on its rails and is charging the same rates as it did with its former service.

The following lines are utilizing motor trucks as feeders to freight business: San Diego & Southeastern Railroad Co., California; Tennessee Iron, Coal & R. R. Co., Tennessee; Michigan Central Railroad, Michigan, and the Boston & Albany Railroad, Maine.

The Androscoggin & Kennebec Railroad, Maine, has abandoned its freight service in favor of motor express service.

The Pittsburgh & Susquehanna Railroad, operating between Phillipsburg to Rainey, Pa., is replacing passenger train service with motor trucks.

The following lines have equipped motor trucks with flanged wheels and are using them instead of steam locomotives: Winchester & Western, Winchester, Va. to Wardensville, W. Va.; New Orleans & Lower Coast, Algiers to Buras, La.; and the Morristown Erie R. R. of N. J., Essex Fells to Morristown. The first line is 40 miles long, the second 60, and the last 10½ miles.

### Reader Is Interested in Mack Rail Car

To the Editor, COMMERCIAL VEHICLE:

In THE COMMERCIAL VEHICLE for December there is a description of the Mack rail car. I would like to know what concern makes this vehicle and where it is located.—EDWIN S. READ, Dorchester, Mass.

This model was made by the International Motor Co., 252 West 64th Street, New York City.

### Burning-In Bearings Is the Best Policy

To the Editor, COMMERCIAL VEHICLE:

Is it a good policy to tighten up the connecting rod bearings fairly tight and then loosen them by letting the engine run slow until they are fitted?—READER.

This method is satisfactory, but burning-in is much better. After the bearings are run in, it is well to examine them and again fit them by removing the thinnest shim, if it is possible to do so.

### What Neon Is and How It Is Used Commercially

To the Editor, COMMERCIAL VEHICLE:

Would appreciate an explanation of neon. Just what is it and how is it used?—R. MORRIS, Jersey City, N. J.

Neon is one of the air's rarest gases. There is only 1 cu. in. of neon in approximately 100,000 cu. in. of air. In actual production, however, several times 100,000 cu. in. of air must be handled to obtain 1 cu. in. of purified neon.

Experiments have proved that neon offers so little resistance to the passage of electricity that, where a 15,000-volt current is required in air, a 200-volt current will suffice in pure neon. In other words, a spark that will jump 1 in. in air will jump 75 in. in pure neon.

It has been found that neon becomes luminous when electrified, emitting an orange-red light as current is passed through it. These characteristics of neon have been utilized in the Airco ignition gage, recently placed on the market. When a metal cap, which permanently seals one end of the gage is brought into contact with a high-tension electric current, the neon becomes luminous and emits flashes of orange-red light, visible through the indicator in the side of the case. No flash would indicate a fouled plug or no current. When the nicked cap of the gage is run along the wires between the plug and coil or magneto, flashes indicate leaks in the current flow.



## Formula for Determining the Pitch of Gear Teeth

To the Editor, COMMERCIAL VEHICLE:

Kindly furnish us with the best formula or method of determining the pitch of the teeth of a gear.—DAVID MC-ROBERTS, Auto Truck Equipment Co., Pittsburgh.

In order to get the diametral pitch of a gear, divide the number of teeth by the pitch diameter, that is, the diameter to half the height of the tooth. Sometimes the circular pitch is used. This is the distance from the center of one tooth to the center of the next, measured along the pitch circle. The circular pitch is equal to the quotient of 3.1416 by the diametral pitch. For instance, the circular pitch of a six-pitch diametral gear is 3.1416 divided by 6, or .53 in.

## Firing Order of All Gas Engines Built

To the Editor, COMMERCIAL VEHICLE:

Do you know of any book published that will give the firing order on cylinders for each engine that is built?—RUSSETO & SCHNEIDER, Chicago.

We know of no such book but refer you to the Oct. 14, 21 and 28, 1920, issues of MOTOR AGE, published in Chicago in the Mallers Building.

## Ford Speeds Chatter—Linings Are Glazed

To the Editor, COMMERCIAL VEHICLE:

I have had considerable trouble with the speeds chattering on our Ford cars. I have been using genuine Ford linings as well as those of another lining maker and they start to chatter in about 1 mo. I took down a couple of our Ford cars and found the lining polished just like glass. They were not burnt, however, and did not show wear. We received a new Ford last month and the speeds also chatter. I took the car to the dealer and he could not understand, saying that he had received several complaints of this kind. Please advise, as I have never had this trouble before.—W. M. FOHL, Standard Oil Co., Canton, Ohio.

After investigation we find that this seems to be a trouble that is experienced by many Ford owners.

The glazing of the linings is a condition which cannot be eliminated. The chattering, which is the direct result of glazed or polished linings can be produced in a relatively short period, by improper application of the foot pedals. By this we mean that some operators have the bad habit of driving with their feet on the clutch or high speed pedal. This practice has the tendency of forcing the first speed band against the drum, while in operation, which glazes the surface of the band.

We have also found that the brake pedal is also very often improperly applied. Many operators depend entirely upon their foot brake to retard the speed of the car, when they should be using the engine as a brake, thus permitting car to slow up before applying brake.

These tendencies may be termed as the causes. As to the remedy, we cannot give any permanent cure. However,

you will find that by removing the small cover on top of the transmission and inserting a small amount of cup grease between the bands and drums, at the point where the springs hold the brake bands apart, the chattering will be silenced. By this method it is possible to operate from 1 to 2 mos. before chattering presents itself again.

## Wants to Know How Long It Will Take to Pay for Truck

To the Editor, COMMERCIAL VEHICLE:

I have a chance of buying a 2-ton Selden truck which is in good condition. It has been run about 8000 miles and the tires are in good condition. This truck can be bought for \$1,200 as the party has no further use for it.

I live 5 miles from Kane in the oil country and work a farm. After my farm work is finished I use a team in the oil fields. Now do you think that if I buy this truck that I could make the price that I would pay for it and how long will it take for me to pay for the truck?

How much should I charge to haul a 2-ton load 5 miles?—A. F. NELSON, Mt. Jewett, Pa.

We believe that you are making a safe investment providing what you say about the condition of the truck is true.

In looking over our records covering the cost of operation on trucks of 2-ton capacity we find that the cost per mile varies from 25 cents to as high as 50 cents. You can therefore readily understand that it will be impossible for us to give you any definite information covering just what you should charge to haul a 2-ton load 5 miles.

If you could give us more complete information covering the number of trips per day made by your truck and whether both ways of a trip will include pay loads we could therefore be of more benefit to you.

You must not forget that in order to realize any benefit from an investment such as yours, it is imperative that the vehicle be kept in use most of the time during the day. You state that you do farm work and when finished with that go to the oil fields and then do general carting.

Are you sure that your truck will be kept busy all of the time and that you will have enough business on hand to warrant its purchase? You must realize that when your truck is idle during the day it is losing money for you because you are not realizing any interest on your investment.

## Reader in Switzerland Wants Truck Information

To the Editor, COMMERCIAL VEHICLE:

I would like to know how many motor trucks of different loading capacities are now in operation in the United States. I would also like to know the number of passenger cars of different capacities now in operation in the United States.—FRITZ MEYER, Basel, Switzerland.

In the accompanying table you will find production figures of trucks for 1918, 1919 and 1920 according to capacities. These figures are compiled by the

National Automobile Chamber of Commerce. The 3 years' production totals about 815,000, and as it is estimated that there are about 1,000,000 trucks in operation in the United States at the present time, these figures will give you a fair idea of the way in which the trucks now in use are divided according to the different capacities.

Figures of this nature are not available as regards passenger cars. The 1920 production of passenger cars amounted to 1,883,158 cars, of which number about 17 per cent, or 320,000, were enclosed. This includes sedans, coupés and limousines. It is estimated that this year the closed car production will approximate 22 per cent of a possible production of about 1,450,000 passenger cars. Of the remaining 78 per cent which will be open models, it is believed that very nearly 90 per cent will be of the touring type, that is, the five and seven passenger open models, and the remaining 10 per cent will be roadsters.

You will find in another table the number of trucks and cars in Canada, Mexico and the various countries of South America.

### 1918 N. A. C. C Truck Figures (United States)

		Per Cent
1 ton and under.....	100,417	47.9
1 1/2 to 2 1/2 tons .....	79,070	37.6
3 to 4 tons .....	25,128	11.9
5 tons .....	5,079	2.4
Over 5 tons .....	466	0.2
Total .....	210,100	

### 1919—Estimated

		Per Cent
1 ton and under.....	153,517	51.3
1 1/2 to 2 1/2 tons .....	88,614	31.1
3 to 4 tons .....	21,676	7.5
5 tons .....	15,907	5.4
Over 5 tons.....	2,683	0.9
Total .....	282,397	

### 1920

		Per Cent
3/4 ton .....	61,187	19
1 ton.....	164,214	51
1 1/2 tons .....	35,424	11
2 tons .....	25,763	8
2 1/2 tons .....	12,871	4
3 1/2 tons .....	12,893	4
5 tons .....	6,441	2
Over 5 tons .....	3,430	1
Total .....	322,639	

### 1921 Registration of Cars and Trucks in Other American Countries

Canada .....	160,000	15.0
Mexico .....	75,000	7.5
Argentina .....	70,000	100
Brazil .....	15,000	12,395
Guatemala .....	500	2,800
Nicaragua .....	200	2,500
Panama .....	1,200	1,500

NEW YORK, Jan. 10. The Automotive Service Assn. of New York at its annual meeting elected Henry M. Holt, service manager of Willys-Overland, Inc., of New York, as its president for 1922. J. Willard Lord of Pine Arrow was elected vice-president and Frank J. Lowe, representing Ford in Flushing, L. I., was re-elected treasurer. The board of directors appointed H. J. Lang of Willys-Overland, secretary and general manager to fill the position formerly occupied by J. Howard Pile. The directors elected were Ralph C. Rognon, J. Howard Pile and Edward J. Rabadoux.



## Regulation of Bus Lines

EVERYTHING must have a beginning. And, as was natural, the motor bus as a transportation factor began in a small way, unregulated, inefficient and groping for its place in the scheme of things.

But the motor bus has long since passed that stage. Now, both in the city and in the country, and immediately, in the suburbs, the motor bus has grown into the life of the people all over the country and has become a recognized and a favored form of transportation.

Curiously, the last people to recognize the importance and the future dignified standing of motor bus transportation are the bus operators themselves, at least in certain cases.

Motor bus lines are just as capable of carrying passengers in large numbers throughout the year, over definite routes, to schedule and efficiently as are street car lines and railroad lines, although the routes are not of the same length or type. They are actually doing this at fixed fares and schedules in many parts of the country, supplying a reliable public service at a fixed rate.

But if that is the case, they are entitled to recognition on the same scale and basis as that given the street car lines and the railroads.

Recognition involves regulation. As any public service, power, water transportation or telephone grows into a big public utility it becomes subject to regulation. This is not repressive, it is constructive. It is a compliment to the size and importance of the service and an aid to further growth.

And now the time has come for the regulation of bus transportation.

In certain quarters there is a tendency to resist this regulation. The bus operator has been through some hard times getting his bus line started and keeping it running, and he has learned to fear any kind of legislative action as a hostile move.

In this he is making a big mistake. The public has come out strong for bus transportation and it is, therefore, a foregone conclusion that bus transportation will survive. But it will become permanently established all the quicker and will be able to come out in the open and lay its cards on the table all the more weightily if it is under public control and is regulated—and, therefore, backed

—by the public service commission of each state.

Bus operators should welcome public regulation not only as a big step up in the public mind, but as a sound defense against unjust criticism.

In a growing number of states, like Connecticut, New York, Pennsylvania, Illinois, New Jersey, California and Washington, overland bus operators must obtain certificates of convenience and necessity. This regulation is of varying degrees of value, according to the point of view of the commission. In one case the Illinois commission granted a certificate permitting competition with an electric railroad because the latter had not met the commission's ideas of a proper standard of service. But the same commission refused a certificate to another applicant who wanted to compete with an electric railway giving satisfactory service.

The latest addition to the states governing bus transportation is Oregon, which has placed motor buses and trucks under the strict direction of the Oregon public service commission. But while the law is aimed to protect the public roads and to guard the welfare of the traveling public, it has the support of the legitimate bus lines.

Well-organized bus lines have nothing to lose and everything to gain by being regulated in this way. In the first place, the thought in the mind of the bus operator should be co-operation with existing transportation lines rather than competition. The bus line has a separate field that does not encroach on that of the street car, *where the street car can give a satisfactory service*. If there is competition—that is, if the street car line is not satisfactory—that is because the field belongs to the bus and not to the street car, from an economy standpoint. And an uneconomical, unsatisfactory street car line is no good to anyone and will fail in any case. The public service commissions will be quick to recognize this and to arbitrate fairly between the two classes of transportation—because there is no real competition between these two systems, where both are efficient.

Let us have regulation and let us have it with all speed. In the meantime let us concentrate on accurate schedules, fair rates and suitable vehicles and waste no time obstructing a development which is for the ultimate good of all concerned.



## Refuse Federal Aid Against Trucks

### Short Line Railroads Think Motor Trucks Should Not Be Under U. S. Control

WASHINGTON, Jan. 4.—Although admitting that motor truck competition had cut down the volume of their short-haul traffic, Bird M. Robertson, president of the American Short Line Railroad Association, told the Senate Committee on Interstate Commerce that railroad officials had rejected a plan submitted by a member of the House of Representatives to place motor trucks engaged as common carriers under the control of the Interstate Commerce Commission.

He declared that an investigation by railroad officials brought the conclusion that it would not be feasible to amend the interstate act in any way to place that class of carrier under Federal control, as it would probably necessitate an entirely new transportation act. This decision was rejected when statisticians showed that the percentage of interstate business handled by trucks was so small that it would probably not justify Congress at this time in dealing with the matter.

In connection with the proposal for Federal regulation of motor truck lines, Robertson said:

We are of the opinion that there cannot be any Federal regulation. We have investigated that matter and find that only 4 per cent of their business is interstate; something more than 90 per cent of their business is probably intrastate, and therefore it would be very difficult for the Government to meet that situation.

It is also interesting to note that Robertson referred to the interest which other railroad organizations are giving to this duplication of service. He said:

The railroads must not only build and maintain their own tracks but are taxed heavily to create and maintain the highways used by the trucks; operate upon schedule, and are governed rigidly as to the charges they may make. Under these conditions the motor trucks underbid the railroads on the cream of the local business, though they are under no obligation to operate during bad weather. In this way they not only duplicate existing lines and service, but by decreasing the volume of traffic of the railroads they increase the cost of the service of the rail carriers.

Some states have given their railroad commissions authority to regulate motor trucks, but in most of such states the commissions utterly fail to prevent the duplication of the service and fail to require them to compete upon a fair basis.

If there be any duplicated railroads that do not render a real public purpose, they should be abandoned, and the commission has power to accomplish that result.

I doubt the ability of the Government to prevent a manufacturing enterprise from running its own motor trucks and rendering service. I refer exclusively, in my statement, to those doing business as common carriers.

Senator Cummins of Iowa, chairman of the committee, pointed out the difficulty in obtaining reliable data on truck

## HERE'S A "STICKER" FOR LICENSE APPLICANTS

BRIDGEPORT, Conn., Jan. 10.—That ability to read and write English should be one of the fundamentals required of an applicant for a motor vehicle operator's license is the opinion being freely expressed by authorities throughout southern New England. Agitation along this line is rapidly developing, as a result of a number of recent serious accidents, where driver, or drivers, at fault has been found to be an alien with little acquaintance with the English language. The main reason given favoring the proposed requirements is that ability to both speak and read English is necessary to properly understand rules of the road.

movements. Senator Poindexter told the committee that complaint is beginning to arise at a few points throughout the country of State oppression, or State discrimination between certain rivals of common carriers of interstate business, and inquiry is being made as to why the Federal Government does not protect them. The Senator said that he had never discovered that any Federal Government had in any way ever endeavored to do anything at all about it.

## Price Changes

BUFFALO, Jan. 3.—The Stewart Motor Corp. has reduced the prices of its various models. The schedule follows:

Model	Old Price	New Price
3/4 ton.....	\$1,395	\$1,195
1 ton.....	1,875	1,395
1 1/2 ton.....	2,200	1,790
2 ton.....	2,800	2,090
2 1/2 ton.....	2,950	2,290
3 1/2 ton.....	3,850	3,090

DETROIT, Jan. 3.—Effective Jan. 1 another reduction in prices was made by the Denby Motor Truck Co. The prices follow:

Model	Old Price	New Price
3/4-1 1/4 ton.....	\$1,625	\$1,485
1 1/2-2 ton.....	2,300	2,145
2 ton.....	2,600	2,395
2 1/2-3 ton.....	....	2,795
4 ton.....	4,200	3,895
5 ton.....	4,850	4,295
7 ton.....	5,500	4,945

These reductions, together with those made July 1 last, bring Denby trucks back to pre-war prices.

DETROIT, Jan. 4.—The Maxwell Motor Corp. has reduced the price of its 1 1/2-ton truck by \$400 on all models. The range now is from \$932 on the chassis to \$1385.50 on fully equipped models.

## Erie Uses Trucks for Inland Freight

### About 100 Trucks Supplied by U. S. Trucking Corp. Will Relieve Congestion

NEW YORK, Jan. 5.—Transportation of inbound freight from the cars direct to the consumer by motor trucks was begun yesterday by the Erie as part of the road's new system for bringing the freight from the New Jersey rail terminals into this city without the use of floats.

About 100 trucks supplied by the United States Trucking Corp. were operating yesterday under the new plan. Freight arriving at Jersey City in carload lots was loaded in the trucks. The trucks brought the freight to the Manhattan consignees on the Erie's ferries during the non-rush hours. Other freight was brought to the Independent Warehouses' branches at Lighthouse and Greenwich streets.

J. J. Mantell, general manager of the Erie, said the new plan would be more economical than the old, which meant the transfer of the cars across the river on floats and running the cars upon the piers, whence trucks sent by consignees carted off the freight. The use of much pier space for the trucks was one of the big items of expense, Mantell said.

The new system, Mantell said, would be extended largely in the near future. The intention is to use containers that hold a truck load, which are so constructed that they can be put on the motor truck chassis and on arrival at destination be emptied quickly.

## Protects Truck Owners from Competition

DETROIT, Jan. 3.—The Michigan Public Utilities Commission through its chairman, Sherman T. Handy, has outlined its policy toward controlling motor truck lines. The commission will endeavor to prevent dissipation of utility property by unfair and unnecessary competition. Bus routes are already under state control in Ohio.

"When the Legislature seeks the co-operation of this commission in drafting legislation for the regulation of motor truck transportation, we will recommend such legislation as will protect the pioneer, stable and serviceable interests then engaged in it from unfair and unnecessary competition to the end that a fair return may be received on the investment and a fair grade of service rendered to the public," Handy says, in speaking of the situation.

Handy believes manufacturers operating their own truck lines could not be designated as common carriers. Authorization of motor truck lines parallel to existing serviceable transportation routes is regarded as unlikely. "Loss to the public inevitably follows unreasonable and unnecessary utility competition," says Handy.

## New York Bus Owners Organize

### Auto Bus Assn. of New York State Will Include 200 Bus Line Operators

ROCHESTER, N. Y., Jan. 4—Motor bus operators of New York state organized an association here recently, and have established permanent quarters at the Powers Hotel. James J. Dadd, of Rochester, was chosen secretary and treasurer of the new organization, while Alan V. Parker, of Niagara Falls, was made president. The vice-president is A. F. Warner, of Watertown. Forty operators from various parts of the state attended the meeting and the membership will be extended to include the operators of the 200-odd bus lines in this state. The new organization will be known as the Auto Bus Assn. of New York State.

The bus lines of the state represent a capital expenditure of more than \$6,000,000 and serve more than 400 cities, towns and villages. The object of the association is to promote the interests of the owners and operators of bus lines throughout the state. The association has for its purpose the contesting of legislation that is expected to be introduced in the Legislature on behalf of the railroads and trolley lines.

The association holds that there is a distinct need in the state for the bus lines and that their curtailment will result in much inconvenience to many communities. John J. McInerney, a Rochester attorney, will head a committee that will formulate a program to counteract legislation that may be introduced in behalf of the steam and electric lines.

Another purpose of the association is to make it impossible for irresponsible persons to operate bus lines. Protection of the traveling public is said to be an aim of the association and it is expected that legislation will be asked looking to this end.

The association officers say that the bus lines are here to stay and it is to the best interests of the state and the responsible owners to regulate the business and place it on a sound basis.

### Portland Opens New Bus Depot

PORTLAND, Jan. 5.—Portland's new motor bus depot, a new \$15,000 structure in the heart of the city and one of the busiest and most complete depots of the kind in the country, was opened for use last week, and now is running full swing. The depot, which is located just one block off of the busiest street of Portland, is owned by a corporation formed by the bus line owners, and represents the fruits of a co-operative movement on the part of the bus operators.

Although the present schedule of operations from the bus depot is declared to be just a starter, there are already over 100 different buses leaving from the place daily, many of the buses making two or three trips from the depot each

## BUSES ARE REVIVING STAGE LINES IN SOUTHWEST

FORT WORTH, Texas, Jan. 3.—Frontier stage lines, driven out of existence by the steam locomotives, are being revived by the modern heated motor buses in the Southwest. For instance, this sign hangs in Stephenville, Tex.:

"Take the stage line to Fort Worth. Quicker, safer and better—All cars heated."

This is only an isolated instance of the sudden popularity of the motor stage lines in all parts of the Southwest, especially in the prairie districts where roads are seldom bad and natural barriers are never encountered. Often the new motor vehicle routes traverse the roads, now improved, of the old horse-drawn stages. One of them is from San Antonio to Brady in McCulloch County, straight across the cattle country and cane brakes of the Llano hills. From a financial standpoint, the new type of stage is said to be paying well.

day. Under the schedule bus lines are operating to every city of any importance within a radius of 100 miles from Portland, and some of the lines are over 100 miles.

The new depot resembles a railroad depot, with waiting rooms, ticket office, announcer, etc. At the rear of the depot building is a covered platform with drive-in from the street, where the buses load or unload. Under the arrangement the patrons remain in the waiting room until the bus drives up to the platform. The bus is then announced and the people pass through the door and take their seats, just as they are seated in a train. Regular time tables are maintained.

There will be no such thing as making patrons wait for a later scheduled stage in case the car which they hoped to take is filled before they secure seats, it is announced. Several stages will be kept in reserve at all times, and in case the regular stage is not sufficient to carry all who have secured tickets a reserve stage or stages will be brought up to take all.

Under the present schedule, which will probably be enlarged as the terminal expands, 150 departures in twenty-one different directions are provided. This gives many of the closer towns hourly bus service, while the more distant points are served by two buses per day.

### Champion Plans Speedometer

DETROIT, Jan. 5.—The Champion Ignition Co. soon will begin the manufacture of a speedometer which will require a large addition to the present plant at Flint.

## Ohio Bus Owners Are Amalgamated

### Initial Membership Consists of 125—To Secure Better Legislation

COLUMBUS, Ohio, Jan. 9—The Ohio Bus Owners' Assn. is the name of a new organization formed by bus owners from many sections of the Buckeye State meeting in Columbus early in January. Headquarters for the new association are located at 562 East Mound St. temporarily but it is planned to get a downtown location in Columbus. The initial membership consists of 125 but other owners are coming in and it is expected that the membership will be doubled by the latter part of January. The motto is "In Unity There Is Strength."

The object is to secure favorable legislation, not only at the hands of the state government but more especially in the various municipalities where bus lines are operated. Favorable publicity is another object of the association. At present there is considerable unfavorable publicity in various newspapers.

R. E. McCollum, Columbus, is president; G. E. Harriot, Marysville, vice-president; C. H. Frazer, Mt. Vernon, secretary, and C. M. Johnson, Grove City, treasurer. These officers with Randolph Walton, Columbus; H. M. Donegan, Columbus; J. H. Ray, Washington Court House; George G. Clark, Cleveland, and I. B. Baker, Cambridge, constitute the board of directors.

### Adds Rail Car Division

WABASH, IND., Jan. 3.—A railroad car division, with a complete staff of its own, has been announced by the Service Motor Truck Co., following a demand created by demonstrations to railroad companies of the 30-passenger railroad coach mounted on a Service truck chassis. Charles Guernsey, for several years chief engineer of the company, has been made manager of the division; William Petty succeeds him as engineer, while William E. Marvel will be manager of sales of the railroad division.

Fifty railroad officials are expected here late in January to witness a test and demonstration of a new 55-passenger railway coach mounted on a Service truck. The new design is now under way.

### To Fight Truck Law

TOLEDO, Jan. 2.—Merchants and manufacturers here are planning to fight enforcement of the Burke law regulating the maximum loads for trucks on the highways of the state.

The Merchants & Manufacturers' Board of the Chamber of Commerce has taken up the fight and will seek to get the law changed before it is enforced in its present form. Business men at the meeting said strict enforcement of the law would throw into the discard practically all of the trucks now in use by large firms in this territory.



## Direct Service Plan in Operation

### Forty Central Parts Stations and More Than 300 Branch Stations Serve Owners

NEW YORK CITY, Jan. 9.—The direct service plan by leading unit parts manufacturers has been inaugurated, and under the arrangement forty central parts stations and more than 300 branch stations will begin immediately the furnishing of parts for units direct to owners of trucks in which these units are standard equipment.

Included in the plan at the outset are the Continental Motors Corp., Timken-Detroit Axle Co., Brown-Lipe Gear Co., Borg & Beck Co., and the Spicer Mfg. Co. Each of these represents a separate unit entering into the manufacture of a truck. Other manufacturers will be embraced in the plan until it includes at least one manufacturer of each important unit.

Several of the most important results which the unit makers claim for this plan are set forth by the committee in charge of the plan as follows:

**Doing away with pirate parts.**—It will make it unnecessary for the dealer to nullify the guarantee on his vehicle by selling his customers inferior parts made by other than the manufacturers of the original unit. This action on the dealer's part has been necessary in the past as he was not able to obtain genuine parts immediately. The stations carry only genuine parts designed, produced and inspected by the specialists of the unit manufacturer's organization.

**Lowering of parts prices.**—Direct assistance to manufacturers, dealers, small and large fleet owners and users.

**Guarantees genuine parts** so that the dealer and owner of specialized vehicles can depend upon purchasing genuine material.

All parts are to be trademarked by the unit manufacturer producing them. This will provide a universal means of identification and a guarantee of protection and value.

One of the greatest drawbacks to the automotive industry in the past has been the inability of the car and truck owner to enjoy uninterrupted service because the dealer was unable to obtain genuine parts immediately. Two of the most important reasons for this is the financial situation of the average dealer and the ever-increasing rate of dealer mortality.

This plan, then, of the leading unit manufacturers is built from the ground up. Acknowledging the importance of service, they have started at the beginning by putting parts distribution on a firm, permanent foundation, where it will bring the greatest good to the greatest number.

The parts service end of the plan assures the owner and buyer that they can keep their vehicle in uninterrupted service anywhere in all parts of the

## HERE'S A GOOD SUGGESTION FROM LONDON

LONDON, Dec. 24 (By Mail).—The proximity of the Manchester manufacturing center to the great seaport of Liverpool has led to such a rapid development of motor transport in Lancashire it has been suggested that an existing railroad should be converted into a motor road. At present three separate lines connect the two cities.

world where automotive equipment is used.

This plan divides the United States into forty territories. The size of each territory has been proportioned in accordance with the population, vehicle registration, buying power and the vehicle sales possibilities for the future. Each of these forty territories is to be serviced by what has been called a major parts depot. This is to serve as a central distributing point for the territory.

Of the forty stations planned, thirty-five are now in operation with the remaining five in process of development.

In each territory and under the jurisdiction of the major station are a series of sub-stations. These sub-stations distribute in a specified local territory. There will be from six to ten sub-stations under each major station. The location of each sub-station is such that immediate parts delivery will be possible in all important localities and a maximum of 5-hr. service possible in the less populated districts.

It is estimated that there will be at least 325 sub-stations distributing genuine parts in their respective territories.

## Tidewater Lines Plan Extension

GETTYSBURG, PA., Jan. 10.—The Tidewater Lines, Inc., and the Gettysburg-Harrisburg Transportation Co. may cooperate in the establishment of a freight and passenger line between Gettysburg and Baltimore and a passenger line between here and Washington. Meetings have been held recently with a view to working out some plan for making these extensions.

## Trucking Firm Merger Looms in Detroit

DETROIT, Jan. 4.—F. L. Henk, manager of the Detroit Transportation Association and secretary of the National Team and Motor Truck Owners' Association, states that a merger of three large trucking concerns is to be effected here within a short time and that other similar organizations are expected to be formed within the next year.

"The leading truck operators of Michigan plan to establish a transportation system in the State that will supplement the railroad service and that will be copied largely from the railroad plan," Mr. Henk said. "Terminals are to be established in all cities where freight will be received and dispatched just as it now is handled at railroad freight houses. By systematic planning and cooperation among the trucking interests it will be possible to keep the trucks loaded at all times."

## Trucks and Buses Are Ruled Off Highways

### Drastic Ordinance Adopted by Contra Costa County in California

SAN FRANCISCO, Cal., Jan. 5.—The board of supervisors of Contra Costa County, lying directly across the bay from San Francisco, and one of the large and heavily-populated counties of the state, has adopted an ordinance closing four of the principal main highways of the state to motor stage, motor bus and motor truck traffic. The roads which the ordinance closes to truck and stage line traffic are the Tunnel Road from the Alameda-Contra Costa County line to Walnut Creek; the San Pablo Canyon Highway, from San Pablo to the Tunnel Road; the Clayton-March Creek Road from Concord to Pyron, and the Willow Pass road from Concord to the Martinez-Pittsburg Highway.

The ordinance goes into effect Feb. 3, 1922, and conviction of violation is made punishable by a fine not to exceed \$500, or imprisonment not to exceed 6 mos., or both such fine and imprisonment. The ordinance states that its enactment is "in the interest of public safety and for the protection of the general traveling public." The ordinance expressly prohibits the "transportation of persons and property for compensation" on these four highways. Several other counties in the northern part of the state are preparing similar ordinances.

It is understood that these ordinances were instigated, and in some instances drafted, by attorneys for the railroads, especially the short lines, operating in northern California. Privately-owned trucks, operating in the hauling of their owners' products, from farms to market, or from stores to consumers, still can operate over these roads, but express and freight lines, or any other truck lines operated for pay, are barred.

## Fay Bus Co. in Trouble

ROCKFORD, ILL., Jan. 10.—Judge Kene-saw Landis has granted an injunction in the Federal Court, restraining the Fay Motor Bus Co., this city, from disposing of any of its assets during the pendency of the involuntary petition in bankruptcy. He also continued the hearing in relation to the bankruptcy case until Jan. 20 in order to investigate further the charges by Thomas Fay that the petition was "an attempt to wreck a competitive organization." Criminal libel proceedings are contemplated by Fay against the Rockford City Traction Co., which claims a judgment of \$3,749.

Fay owns forty buses and operates eighteen in this city. When T. J. Fay, president, sought capital stock increase last spring the Commerce Commission placed a valuation of \$109,000 upon his properties. The traction company plans inauguration Jan. 15 of "feeder" buses to its street car lines.



## Delivery Convention Plans Completed

### Program at Boston Conference Best Ever—Big Attendance is Expected

NEW YORK CITY, Jan. 10.—The coming convention of the International Retail Delivery Assn., which will be held at the Copley Plaza Hotel, Boston, Mass., Jan. 30 to Feb. 2, will, without doubt, be a most important event.

Year after year the annual convention of the association has grown, both in size and importance. The first convention, staged in 1917, was attended by a small handful of delivery executives from the retail stores of the country. At last year's convention there were more than 600 representatives present. These representatives came from stores in all parts of the United States and Canada.

That the association has grown from a handful of delivery executives to a membership of some 200 stores proves that it has fulfilled what it had started to do—the improvement of delivery methods through the interchange of ideas.

The membership of the association includes such stores as R. H. Macy & Co., John Wanamaker, Best & Co., Lord & Taylor, The Rosenbaum Co., Joseph Horne Co., Block & Kuhl Co., Mandel Bros., T. Eaton Co., Goodwin's, Ltd., Lit Bros., Gimbel Bros., J. L. Hudson Co., The May Co., Jordan, Marsh & Co., Wm. Filene's Sons Co., Franklin Simon & Co., L. Bamberger & Co., Kaufmann Dept. Stores, Pettis Dry Goods Co., Bullock's, Frank & Sedar, Rike-Kumler Co., Stix, Baer & Fuller D. G. Co., Hale Bros., Hudson's Bay Co., A. I. Namm & Son, and many others too numerous to mention.

The program for this year's convention is considered to be the best ever. It will cover subjects that are of vital importance to every store that maintains a delivery department, regardless of size.

One subject that will be of special interest is the Standard Cost System that has been drawn up by the Executive Committee. This system has been drawn up along the lines of the accounting system adopted by the Controller's Congress and a member of that body will be there to explain its workings. With this system in operation it will be possible to make a comparison of delivery costs between all stores, regardless of size or location.

The director of personnel of one of the country's foremost stores will tell how efficiency and co-operation may be brought about between the various selling departments and the delivery department.

How to save money by getting the right kind of insurance will be told by a representative from one of the leading insurance companies in the country.

A year or so ago the retail world was startled by the announcement that the stores of the country were about to adopt the parcel post system for the delivery of parcels for local delivery.

To date there are but few retail establishments using this mode of delivery. At last year's convention the subject was thoroughly covered by a representative from the Post

## GOOD ROADS WITHOUT ADDITIONAL TAXATION

TRENTON, Jan. 4.—The Republican legislators have decided to recommend the passage of a bill placing before the people of this State next fall in a referendum a bond issue for \$50,000,000 for an improved system of State highways. This bond issue carrying charges will be met by the one-mill State tax now in effect, thereby imposing no additional taxation on the public. It will permit of the construction of a modern system of State highways within a few years.

Office Department at Washington. Also several members from stores who are using this system told what success they had encountered.

Since that time there have been many rumors to the effect that the system was to be changed. A representative from the Post Office Department will be on hand at this year's convention to tell just what has been done and also what the Government's attitude is at the present time toward this method of local delivery.

Every store, regardless of size or location is invited to send representatives to the convention. They are urged to send all executives whose work has any bearing whatever on delivery operation.

Those deciding to send representatives should notify the secretary, B. M. Arrick, 239 West 39th St., New York, of their determination so that proper credentials can be forwarded to them.

## Coming Events

- 1922
- Jan. 19-25, Milwaukee, Wis., Truck Show, Auditorium
  - Jan. 21-26—San Francisco, Third Annual Automotive Equipment Exposition, Municipal Auditorium
  - Jan. 30-Feb. 2, Boston, 6th Annual Conference of International Delivery Ass'n at Copley Plaza Hotel.
  - Feb. 3-10, Minneapolis, Minn., Fifteenth Annual Automobile Show, Minneapolis Auto Trade Ass'n, trucks and accessories. W. R. Wilmet, Mgr.
  - Feb. 4-11, Youngstown, O., Truck Show.
  - Feb. 6-9, Scranton, Pa., Truck Show, Armory. H. B. Andrews, Mgr.
  - Feb. 12, Madison, Wis., Truck Show, Cartwell Bldg. F. W. Mowry, Mgr.
  - Feb. 11-18, San Francisco, Cal., Sixth Pacific Automobile Show, Exposition Auditorium, trucks and accessories. G. A. Wahlgreen, Mgr.
  - Feb. 20-25, Duluth, Minn., Seventh Annual Show of Duluth Auto Trade Ass'n, Duluth Armory Bldg., trucks and accessories.
  - Feb. 27-28, Bethlehem, Pa., Truck Show, Armory. J. L. Elliott, Mgr.
  - Feb. 27-March 4 (tentative date), Atlanta, Ga., Second Annual Great Southern Automobile Show, auspices of Atlanta Automobile Ass'n. Auditorium Armory. Trucks and accessories. Virgil W. Shepard, 305 Connolly Bldg., Show Mgr.
  - March 11-18, Boston, Mass., Twentieth Annual Automobile Show of the Boston Automobile Dealers' Ass'n, Mechanics Bldg., trucks and accessories. Chester I. Campbell, Mgr., 5 Park Sq.

## Oregon Classes Bus as Public Utility

### New Law Regulating Operations Has Support of Legitimate Lines

PORTLAND, Jan. 3.—Operation of motor buses and trucks engaged as common carriers in Oregon is placed under the strict direction of the Oregon Public Service Commission, according to a law passed at a special session of the Legislature last week. While the law is aimed to protect the public roads and to guard the welfare of the traveling public, it has the support of the legitimate bus lines.

Under the new law the State Public Service Commission will grant franchises for operation of bus lines under the rule of necessity and convenience to the public, holding the power to revoke these franchises in cases in which the bus operators fail to maintain regular service and charge satisfactory rates. The law virtually places the bus lines under the same general restrictions as the railroads.

The Public Service Commission has the authority to regulate rates charged by the bus lines, to fix rules and regulations governing their operation and to exercise other general regulatory authority. Among the requirements that probably will be made by the commission will be the filing by the bus lines of tariffs showing their rates, and schedules and annual reports covering finances and data regarding operations. The law will prevent the operation of the fly-by-night bus operator, as bus operation which is other than permanent and continuous will not be allowed, except to care for special emergencies.

In regard to operation of trucks on the public roads, the State Legislature reached the conclusion that the present scale of weights and speeds as applied to trucks is ample, and that stricter enforcement of the law is necessary. To cover this phase a measure was passed forming a State motor police under the State Highway Department. This State police will in time replace county speed officers and city motor policemen in the small towns, it is aimed.

A third measure passed by the Legislature provides for increasing the tax on retail sales of gasoline from two to three cents.

## Restrain South Bend Bus Regulation

SOUTH BEND, IND., Jan. 4.—A temporary restraining order against enforcement of the local city ordinance regulating inter-city motor bus traffic was granted in Superior Court here to-day by Judge Chester R. Montgomery, who ruled that the ordinance was discriminatory. The dispute has been carried on for many weeks. The petition for the restraining order was filed by the South Bend Motor Bus Co. of Elkhart.









**UNIVERSITY OF TORONTO  
LIBRARY**

*Physical &  
Applied Sci.  
Serials*

**DO NOT  
REMOVE  
THE  
CARD  
FROM  
THIS  
POCKET**





